A COMPARISON BETWEEN AIRTRAQ OPTICAL LARYNGOSCOPE AND CONVENTIONAL MACINTOSH LARYNGOSCOPE FOR INTUBATION IN ADULT SURGICAL PATIENTS, A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

A STUDY OF 40 CASES

DISSERTATION SUBMITTED FOR

DOCTOR OF MEDICINE

BRANCH X (ANAESTHESIOLOGY)

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

APRIL 2015

CERTIFICATE

This is to certify that the dissertation entitled **"A COMPARISON BETWEEN AIRTRAQ OPTICAL LARYNGOSCOPE AND CONVENTIONAL MACINTOSH LARYNGOSCOPE FOR INTUBATION IN ADULT SURGICAL PATIENTS, A PROSPECTIVE RANDOMIZED CONTROLLED STUDY"** submitted by **Dr.S.KARTHIKEYAN**, in partial fulfillment for the award of the degree of Doctor of Medicine in Anaesthesiology by theTamilnadu Dr.M.G.R. Medical University, Chennai , this is a bonafide original research work done by him in the department of Anaesthesiology and Critical Care,Tirunelveli Medical College, under my guidance and supervision during the academic year 2013 – 2015.

DR.L.D.THULASIRAM M.S(ORTHO)
DEAN
TIRUNELVELI MEDICAL COLLEGE
TIRUNELVELI-627011

CERTIFICATE

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DR.A.THAVAMANI M.D, D.A
PROFESSOR AND HOD
DEPARTMENT OF ANAESTHESIOLOGY
AND CRITICAL CARE
TIRUNELVELI MEDICAL COLLEGE

TIRUNELVELI MEDICAL COLLEGE

INSTITUTIONAL RESEARCH ETHICS COMMITTEE
TIRUNELVELI, STATE OF TAMILNADU, SOUTH INDIA PIN 627011
91-462-2572733-EXT; 91-462-2572944; 91-462-2579785; 91-462-2572611-16
online@tvmc.ac.in, tirec@tvmc.ac.in; www.tvmc.ac.in

CERTIFICATE OF REGISTRATION & APPROVAL OF THE TIREC

REF NO: 473/ANAES/2013/23

PROTOCOL TITLE: A comparison between airtraq optical laryngoscope and conventional machintosh laryngoscope for intubation in adult surgical patients, a prospective randomized controlled study

NAME OF PRINCIPAL INVESTIGATOR: Dr. S.Karthikeyan
DESIGNATION OF PRINCIPAL INVESTIGATOR: Resident in Anaesthesiology
DEPARTMENT & INSTITUTION: Department of Anaesthesiology, Tirunelveli Medical College

Dear Dr. S.Karthikeyan, *The Tirunelveli Medical College Institutional Ethics Committee (TIREC) reviewed and discussed your application during the IEC meeting held on 28.12.13.*

THE FOLLOWING DOCUMENTS WERE REVIEWED AND APPROVED

1.	TIREC Application Form	☑
2.	Study Protocol	☑
3.	Department Research Committee Approval	☑
4.	Patient Information Document and Consent Form in English and Vernacular Language	☑
5.	Investigator's Brochure	☐
6.	Proposed Methods for Patient Accrual Proposed	☑
7.	Curriculum Vitae of the Principal Investigator	☑
8.	Insurance /Compensation Policy	☑
9.	Investigator's Agreement with Sponsor	☐
10.	Investigator's Undertaking	☑
11.	DCGI/DGFT approval	☐
12.	Clinical Trial Agreement (CTA)	☐
13.	Memorandum of Understanding (MOU)/Material Transfer Agreement (MTA)	☑
14.	Clinical Trials Registry-India (CTRI) Registration	☐

THE PROTOCOL IS APPROVED IN ITS PRESENTED FORM ON THE FOLLOWING CONDITIONS

1. The approval is valid for a period of 2 year/s or duration of project whichever is later
2. The date of commencement of study should be informed
3. A written request should be submitted 3weeks before for renewal / extension of the validity
4. An annual status report should be submitted.
5. The TIREC will monitor the study
6. At the time of PI's retirement/leaving the institute, the study responsibility should be transferred to a person cleared by HOD
7. The PI should report to TIREC within 7 days of the occurrence of the SAE. If the SAE is Death, the Bioethics Cell should receive the SAE reporting form within 24 hours of the occurrence.
8. In the events of any protocol amendments, TIREC must be informed and the amendments should be highlighted in clear terms as follows:
   a. The exact alteration/amendment should be specified and indicated where the amendment occurred in the original project. (Page no. Clause no. etc.)
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   c. If the amendments require a change in the consent form, the copy of revised Consent Form should be submitted to Ethics Committee for approval. If the amendment demands a re-look at the toxicity or side effects to patients, the same should be documented.
   d. If there are any amendments in the trial design, these must be incorporated in the protocol, and other study documents. These revised documents should be submitted for approval of the IEC, only then can they be implemented.
   e. Approval for amendment changes must be obtained prior to implementation of changes.
   f. The amendment is unlikely to be approved by the IEC unless all the above information is provided.
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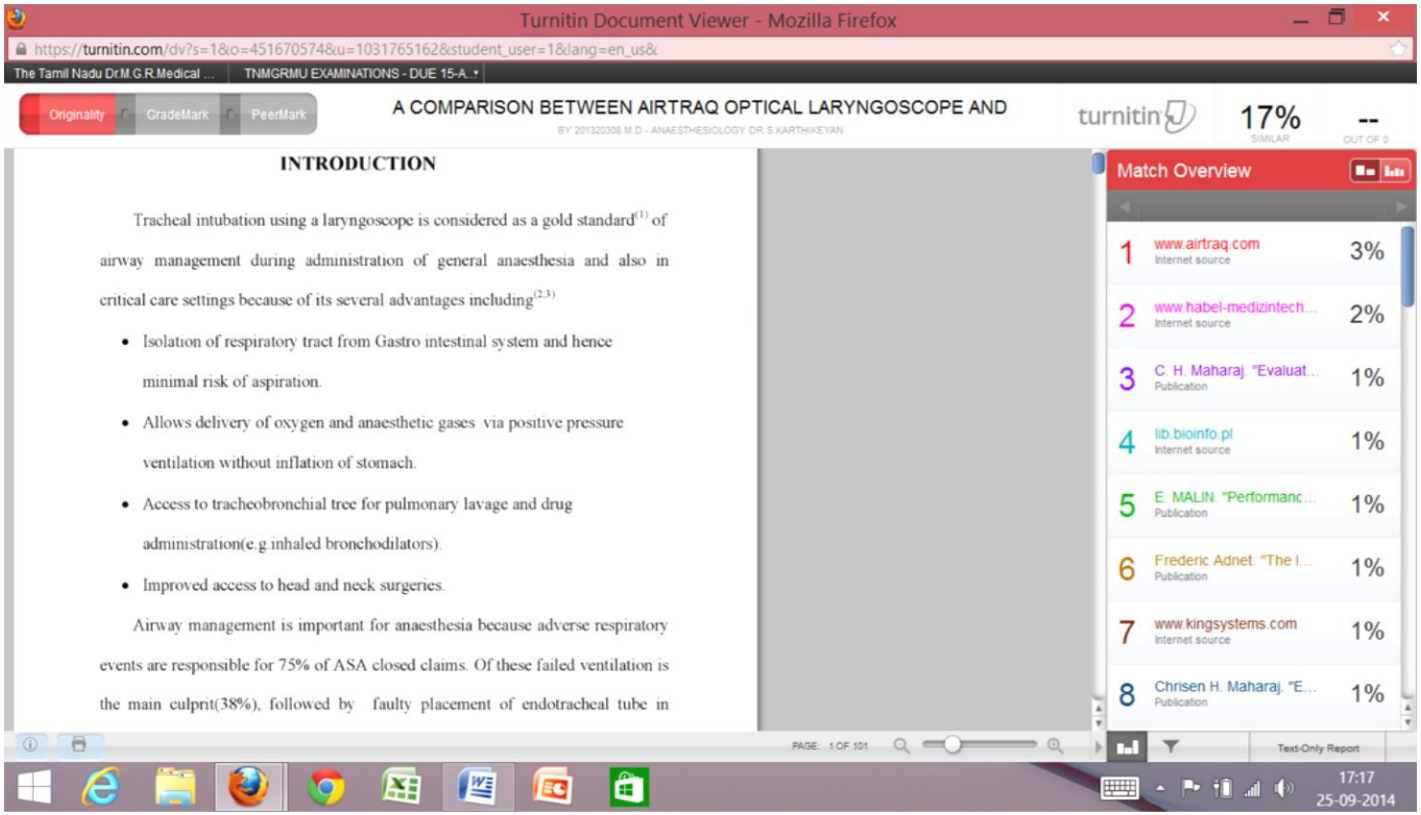
Tirunelveli Medical College, Tirunelveli – 627011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INTRODUCTION
Tracheal intubation using a laryngoscope is considered as a gold standard[1] of airway management during administration of general anaesthesia and also in critical care settings because of its several advantages including[2,3]
Isolation of respiratory tract from Gastro intestinal system and hence minimal risk of aspiration.
Allows delivery of oxygen and anaesthetic gases via positive pressure ventilation without inflation of stomach.
Access to tracheobronchial tree for pulmonary lavage and drug administration(e.g.inhaled bronchodilators).
Improved access to head and neck surgeries.
Airway management is important for anaesthesia because adverse respiratory events are responsible for 75% of ASA closed claims. Of these failed ventilation is the main culprit(38%), followed by faulty placement of endotracheal tube in
PAGE: 1 OF 101
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DECLARATION

I, **Dr. S.KARTHIKEYAN**, declare that the dissertation entitled**"A COMPARISON BETWEEN AIRTRAQ OPTICAL LARYNGOSCOPE AND CONVENTIONAL MACINTOSH LARYNGOSCOPE FOR INTUBATION IN ADULT SURGICAL PATIENTS, A PROSPECTIVE RANDOMIZED CONTROLLED STUDY"**has been prepared by me. This is submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfilment of the requirement for the award of M.D. Degree, Branch X (ANAESTHESIOLOGY) degree Examination to be held in April 2015.

Place : TIRUNELVELI **DR.S.KARTHIKEYAN**

Date :

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CONTENTS

LIST OF FIGURES

S.NO **PAGE NO**

LIST OF TABLES

S.NO **PAGE NO**

A COMPARISON BETWEEN AIRTRAQ OPTICAL LARYNGOSCOPE AND CONVENTIONAL MACINTOSH LARYNGOSCOPE FOR INTUBATION IN ADULT SURGICAL PATIENTS, A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

ABSTRACT

PURPOSE: The objects of this study were to compare the intubating conditions in adult surgical patients using airtraq optical larngoscope with macintosh laryngoscope with respect to ease of intubation, time taken for intubation, airway trauma and hemodynamic response to laryngoscopy

METHODS: In a single centre, prospective, randomized, parallel group, open lable, interventional study, 40 adults patients patients posted for surgery under general anaesthesia need of endotracheal intubation were recruited and allocated in to two group: Group A (n=20) intubated with airtraq laryngoscope and Group B (n-20) intubated with conventional macintosh laryngoscope in standard intravenous induction. The primary outcome measure was ease of intubation which was assessed by intubation difficulty score and secondary outcome measures like

intubation time, airway trauma and hemodynamic parameters for laryngoscopy in every 2 minutes for 10 minutes before and after intubaton were assessed.

RESULTS: 3 patients in the Airtraq group had an Total IDS of more than 1, whereas 10 patients in the Macintosh group had an Total IDS of 1 or greater. In the Macintosh group, 4 patients had an Total IDS of 5 or greater, indicating moderate to severe intubation difficulty, whereas no patient in the Airtraq group had an Total IDS of more than 3.(p-0.0011). Mean duration of intubation with the Airtraq group was 15.93 secs whereas in the Macintosh group it was found to be 38.70 secs (p-0.0001). The increase in mean heart rate from the pre induction to post intubation in airtraq group was 20.9 per min whereas in macintosh group was 31.9 per min. The increase in mean MAP from pre intubation to post intubation in airtraq group was 12.6mmHg whereas in macintosh group was 30.3 mmHg. The differences in heart rate, and blood pressure except diastolic BP in both the groups was statistically significant in the post intubation (4^{th} min) measurements, statistically signigicant difference in systolic BP at 6^{th} mins ($p<0.05$)and not statistically significant difference in the 8^{th} and 10^{th} post intubation measurement..The SPO2 changes in the pre and post intubation periods in both the groups was not statistically significant($p<0.05$). 3 patients in the Macintosh group and 2 patients in the Airtraq group experienced trauma to the airways(p-0.958)

CONCLUSION: Study concluded that endotracheal intubation is easier, less time taken for intubation , less trauma and less hemodynamic response when using airtraq laryngoscope than macintosh laryngoscope. Airtraq laryngoscope significantly improve the view of glottic opening and facilitates fast, easy and reliable intubation. It can also be useful in routine anaesthesia management , in critical care, anticipated , unanticipated airway situations, neuro and cardiac patients due to less hemodynamic response

KEYWORDS: Airtraq, Laryngoscope, tracheal intubation ,Airway, Equipment

INTRODUCTION

Tracheal intubation using a laryngoscope is considered as a gold standard[1] of airway management during administration of general anaesthesia and also in critical care settings because of its several advantages including[2,3]

- Isolation of respiratory tract from Gastro intestinal system and hence minimal risk of aspiration.
- Allows delivery of oxygen and anaesthetic gases via positive pressure ventilation without inflation of stomach.
- Access to tracheobronchial tree for pulmonary lavage and drug administration(e.g.inhaled bronchodilators).
- Improved access to head and neck surgeries.

Airway management is important for anaesthesia because adverse respiratory events are responsible for 75% of ASA closed claims. Of these failed ventilation is the main culprit(38%), followed by faulty placement of endotracheal tube in esophagus (17%) and difficult intubation(18%). Approximately 600 patients die each year in the developed world from complications due to airway management and also in the underdeveloped world is much grimmer[4,5,6].

UPPER AIRWAY ANATOMY

STRUCTURE AND FUNCTION OF THE UPPER AIRWAYS[7,8,9]

Anatomically airway is the passage through which the air passes during respiration. It may be seperated into upper and lower airway. The upper airway contains Nasal cavity, oral cavity, nasopharynx, oropharynx, hypopharynx and larynx.

NASAL CAVITY:

The external nose and nasal cavity are the two divisions of the nose. The Nasal cavity extends from anterior nares to end of the turbinates. The normal airway begins functionally at the anterior nares. As air passes through the nose and the important functions of nose is warming and humidification of air. The primary pathway for normal breathing is nose. The nasal cavities are seperated into two sides by nasal septum. The nasal cavity's roof is cribriform plate of the ethmoid bone. The bony lateral wall contain three bony turbinates that project into the nasal cavity. There are openings in the lateral wall of nasal cavity which communicate with paranasal sinuses.

ORAL CAVITY:

Oral cavity extends from mouth opening to anterior tonsillar pillars. Contracture of mouth can lead to difficult laryngoscopy. Alveolar arch of the

maxilla and teeths form the roof of the oral cavity and it consists of the hard palate anteriorly and soft palate posteriorly, reflextion of mucosa on the mandible and oropharngeal isthmus behind. The tongue occupy most of the mouth, which is bounded by the mandible and teeth. The ability of good mouth opening is important for many airway procedures like laryngoscopy. Initial mouth opening is achieved by rotation within the temperomandibular joint and subsequent mouth opening by sliding of the condyles of the mandible within the joint.

PHARYNX:

The pharynx is a wide fibro muscular tube . It present from the base of the skull to the level of C6 vertebra (lower border of cricoid cartilage). It joins the nasal and oral cavitiy to the larynx and oesophagus. Pharynx is divided into nasopharynx , oropharynx and laryngopharynx.

THE NASOPHARYNX:

Nasopharynx lies behind the nasal cavity .It extends from the posterior end of the turbinates to posterior pharyngeal wall above the soft palate and it consists of the nasal cavity, turbinates and adenoid.

THE OROPARYNX:

Oropharynx extends from the soft palate above and epiglottis below, and anteriorly from tonsillar pillar to posterior pharyngeal wall. It consist of the tonsils, uvula and the epiglottis. The tongue is the main source of oropharyngeal obstruction, because of the decreased tone of the genioglossus muscle of the tongue. The latter contracts to move the tongue forward during inspiration and it acts as a pharyngeal dilator.

LARYNGOPHARYNX:

It present from the tip of epiglottis to the lower border of the cricoids(at the level of C6 vertebra). The larynx bulges posteriorly into the laryngopharynx and the pyriform fossa lying on each side of larynx. This part is important site for foreign bodies like fish bone impaction.

LARYNX:

From the level of the 3^{rd} to 6^{th} cervical vertebrae adults larynx is present . It is a phonation organ. It protects the lungs from the contents of gastro intestinal tract by acting as a valve.

The larynx extends from the epiglottis to the C6 vertebra that is the cricoid cartilage' s lower level. It is suspended from the hyoid bone by the thyrohyoid membrane.

The larynx consists of muscles,various ligaments and framework of cartilages. It has three unpaired cartilage like thyroid , cricoids and epiglottis and three paired cartilages like artytenoid ,corniculates and the cuniform. The epiglottis is a fibrous cartilage. It is covered by mucous membrane. It reflects as the glossoepiglottic fold onto the tongue's pharyngeal surface. The epiglottis projects into the pharynx and overhangs the laryngeal inlet. However, it is not absolutely essential for sealing off the airway during swallowing. The vallecula is the space between epiglottis and base of the tongue. Vallecula has paired depressions on both sides of glosso epiglottic fold.

During conventional laryngoscopy, Laryngoscope blade tip is positioned in the vallecula. Gentle upward pressure on the vallecula with laryngoscope blade causes tensions of hyoepiglottic ligament and it indirectly elevates the larynx and which helps in the alignment of laryngeal and pharyngeal axes.

The epiglottis forms as the inlet of larynx. The apex of the arytenoids cartilages joins to the epiglottis by the aryepiglottic fold on both sides. Inside the larynx one first encounters the vestibular folds. On each side of the larynx,

vestibular folds are present which is a narrow band of fibrous tissue. These structure extend from the anterolateral surface of each arytenoids to the angle of the thyroid where the latter attaches to the epiglottis. These folds are referred to as the false vocal cords. The true vocal cords separated from the false vocal cord by the laryngeal ventricle or sinus.

The pale white colour true vocal cords is a ligamentous structure and it attaches anteriorly to the angles of thyroid and posteriorly to the arytenoids. The triangular fissure between the vocal cords is termed the glottis opening, which is the narrowest segment of the laryngeal opening in adults.

Cricoid cartilage is a signet ring shaped cartilage and continues with trachea. In young children lesser than10 years old the narrowest segment lies just below the cords at the level of the cricoid ring.

The relaxed open glottis's mean length measures 17 mm in females and 23mm in males.

LARYNGEAL LIGAMENTS:

The laryngeal ligaments are separated into extrinsic and intrinsic, which are linked together by laryngeal ligaments. The extrinsic ligaments are thyrohyoid membrane, cricotracheal ligament , cricothyroid membrane and the hyoepiglottic

membrane. Cricothyroid membrane is important in emergency tracheostomy in cases of laryngeal obstruction. Intinsic ligaments comprise the capsule of synovial joint between the arytenoids and the cricoid and between the thyroid and cricoids cartilages.

MUSCLES OF LARYNX:

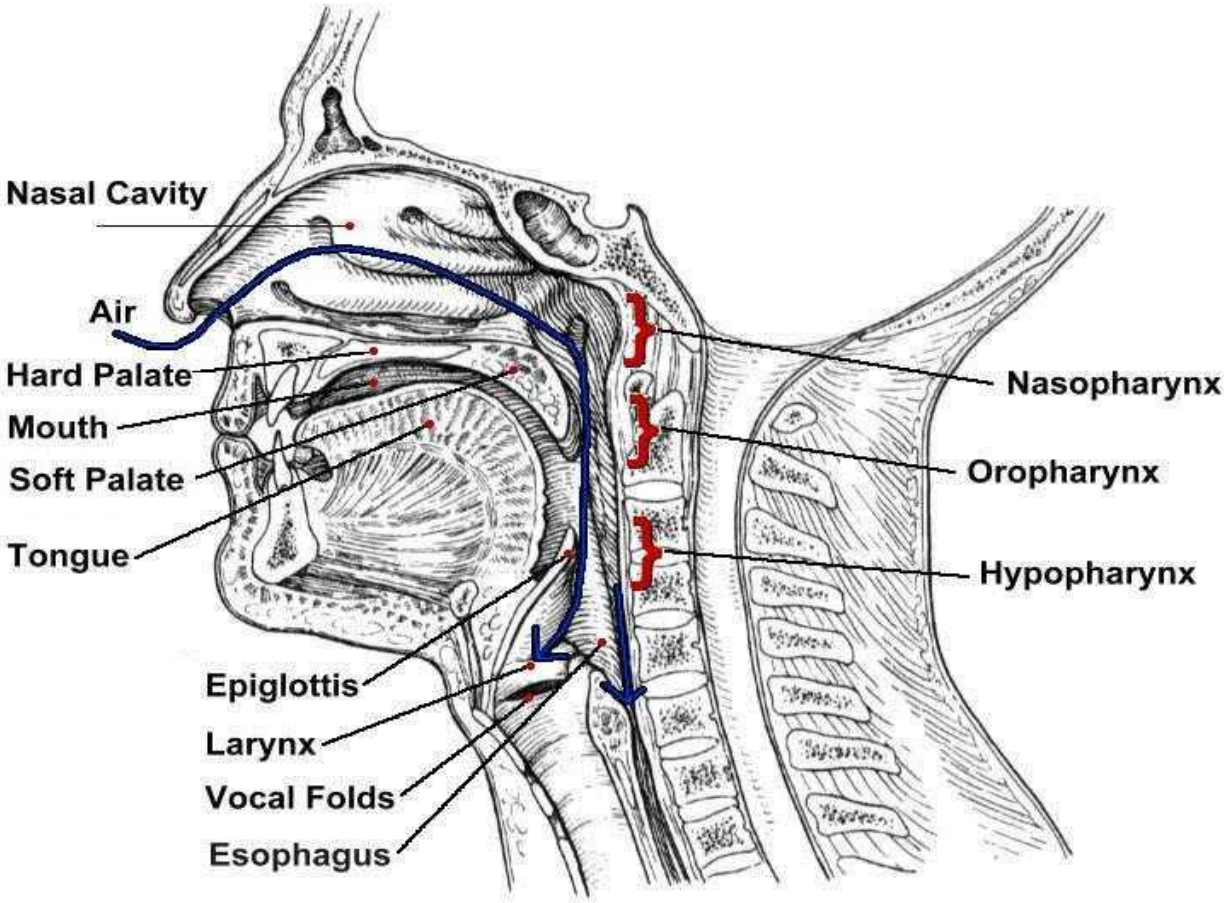
Laryngeal muscles are divided into extrinsic group like thyrohyoid , sternothyroid and inferior constrictor of the pharynx,and intrinsic group like posterior cricoarytenoids, interarytenoids, lateral cricoarytenoids, the aryepigilottic, thyroepiglottic, thyroarytenoid,vocalis and cricothyroid muscles. All the muscle are adductors of vocal cords except abductors by posterior cricoaryteniod and tensors of vocal cord by cricothyroid vocalis

NERVE SUPPLY OF LARYNX:

The recurrent laryngeal nerve supplies all the muscles of larynx which moves the vocal cords, but external laryngeal nerve which is the branch of superior laryngeal nerve supplies cricothyroid muscle.

Sensory supply of larynx above the vocal cord is supplied by internal laryngeal nerve which is the branch of superior laryngeal nerve and below the vocal cord is supplied by recurrent laryngeal nerve.

Figure 1 : Anatomy of upper airway

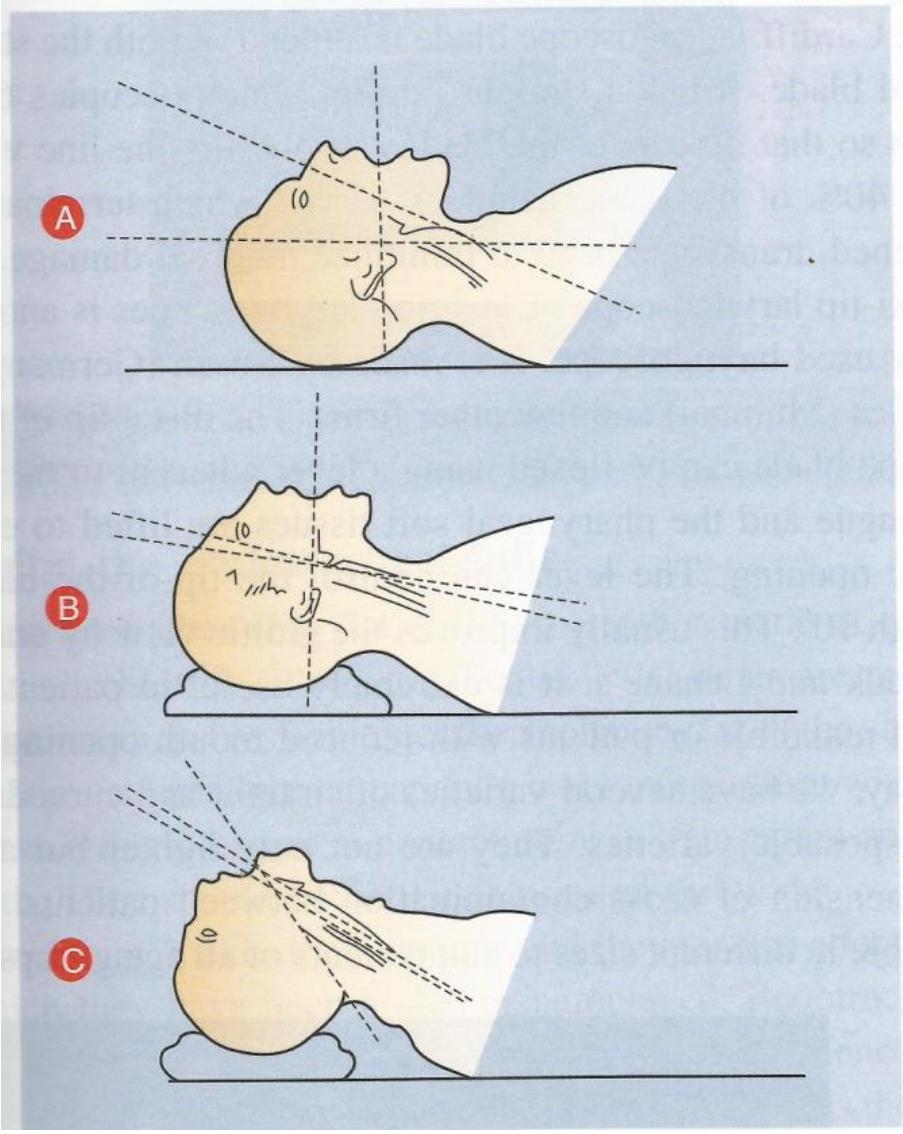


Conventinal laryngoscopy is performed in the supine position. In this position oral, pharyngeal and laryngeal axes of the patient are not aligned, obtain a good view of the glottis by the conventional laryngoscope is difficult. So 25^0 – 35^0 neck flextion and head extension of approximately 85^0 at atlanto occipital joint helps to align the oral ,pharyngeal and the laryngeal axes, and this position is called Magill's (sniffing) position[9,10]

Successful conventional direct laryngoscopy and intubation requires the alignment of oral, pharyngeal and laryngeal axes and the intubation and visual confirmation are often complicated by the anatomical abnormalities of the upper airway, co morbid illness, position of the patient as well as other external factors.

In recent decades, video techniques using fibreoptic technology and Airtraq optical laryngoscopes based on reflecting mirrors are being commonly employed. They have rigid curved blades to match the anatomical alignment to improve the laryngeal view even in patients who can not be kept in ideal sniffing position, without alignment[11] of oral ,pharyngeal and laryngeal axes.

Figure 2: Head position for intubation



OVERVIEW OF LARYNGOSCOPE DESIGN:

Commonly used laryngoscopes can be classified as

CONVENTIONAL LIGHT LARYNGOSCOPES: The light source of the laryngoscope is at the distal end of the blade, powered by batteris at the handle of laryngoscope and electrical connections to illuminate the light.

Examples

- Macintosh type laryngoscope with curved blades
- Miller type laryngoscope with straight blade designs
- McCoy laryngoscope with articulating tip

FIBREOPTIC LIGHT LARYNGOSCOPES[12]: Newer advanced technologies like illuminated electric wire, lights and contacts from blade produces a dependable and brighter illumination. Now LED or XENON lights source that produce excellent source of light, which follows a quartz glass fibre optic bundle or plastic bundle along the blade to illuminate a patient's oral cavity , glottis , trachea and even bronchus anatomy.

Laryngoscopes using fibreoptic principle are:

- Rigid fibreoptic Laryngoscopes
    - Bullard Elite laryngoscope
    - Upsher laryngoscope (USU)
    - Wu laryngoscope (Wuscope)
- Video laryngoscope with portable TV camera
- Airtraq laryngoscope
- Flexible Fibreoptic laryngoscope- Bronchoscopes

HISTORY OF LARYNGOSCOPES[13]

The history of the laryngoscope can be traced from the middle of the eighteenth century; it is only since the early decades of the twentieth century that visualization of the vocal cords considered as important in anaesthesia.

- Vesalius in year 1543 reported the first tracheal intubation in an animal.
- First laryngoscope was used in year 1854 by Manuel Patricio Rodriguez Garcia.

- In the year 1870s, Trendelenburg from Germany performed the first endotracheal anaesthesia in man.
- In year1913 the first anaesthetic laryngoscope was invented by Jackson.
- Modern day laryngoscope systems began in 1940s.
- In year1942, Curare was introduced as a muscle relaxant for abdominal relaxation during general anaesthesia and endotracheal intubation became routine in major abdominal and other surgeries.
- In year 1941, Robert Miller designed a Miller blade.
- A blade with a continous curvature was designed by Robert Macintosh in year 1943. The added curve was designed to the blade for less chance of damage to the patient's teeth.
- Modifications over the years have been developed to both the blades for the purpose of providing more optimal intubating conditions.
- The Airtraq optical laryngoscope was invented by Dr.Pedro Acha and manufactured by Prodol Meditec, Vizcaya, Spain . It was first presented to the market in year 2006.

MACINTOSH

AND

AIRTRAQ

LARYNGOSCOPE

DESCRIPTION OF CONVENTIONAL MACINTOSH LARYNGOSCOPE[11]:

Conventional macintosh laryngoscope consists of a handle and detachable blade. The light source is switched on during the blade and handle are locked in the working position.

HANDLE:

The handle contain disposable batteries which provide the power source for light. A hook on hinge folding connection between the handle and the blade. The handle is fitted with a hinge pin that fits a slot on the base of the blade. This allows quick and easy attachment and detachment blade from the handle. Handles have a metallic contact, which completes an electrical circuit when handle and blade are in working position which cause light is switch on.

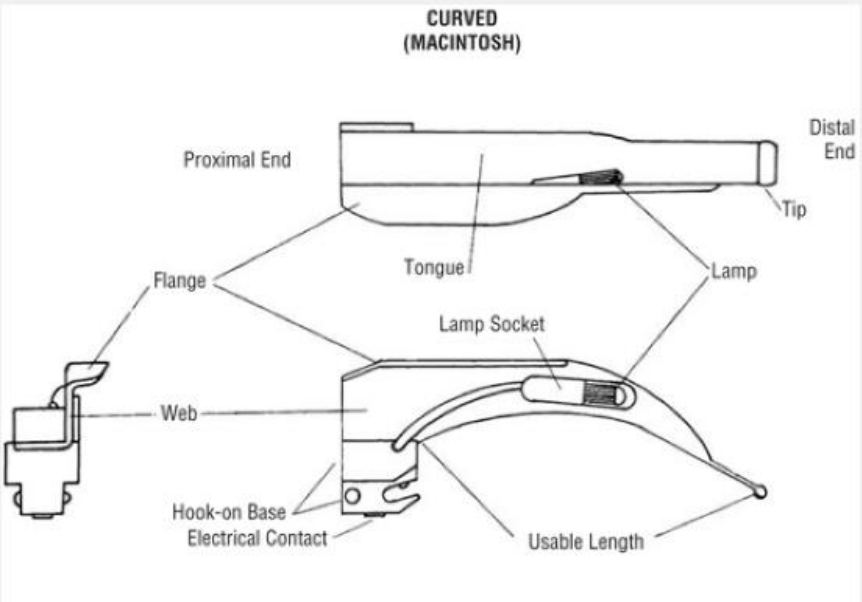
BLADE:

The blade is the rigid component of the laryngoscope which is inserted into the oral cavity. Their variable sizes of blade are 0,1,2,3,and 4 according to the ages is available. The blades are consists of a base, heel, flange, tongue, web, tip and light source. The tongue or spatula is the main shaft of blade. It has smooth, gentle curve that extends to the tip. It serves to compress and manipulate the soft tissues

like tongue and lower jaw. The flange of the blade projects off the side of the tongue and is connected to it by the web. It serves to guide the endotracheal tube in to trachea and deflect tissues out of the line of vision. The flange determines the cross sectional shape. In Macintosh blade the cross sections shows reverse Z. The tip or beak contacts vallecula and helps to elevate the epiglottis to visualize the vocal cords. Tip is usually blunt to decrease trauma. The tip of Macintosh blade has bulb or fiberoptic light which transmit the light from handle by battery during correct working position.

Figure 3 :Macintosh laryngoscope

Figure 4: parts of Macintosh blade



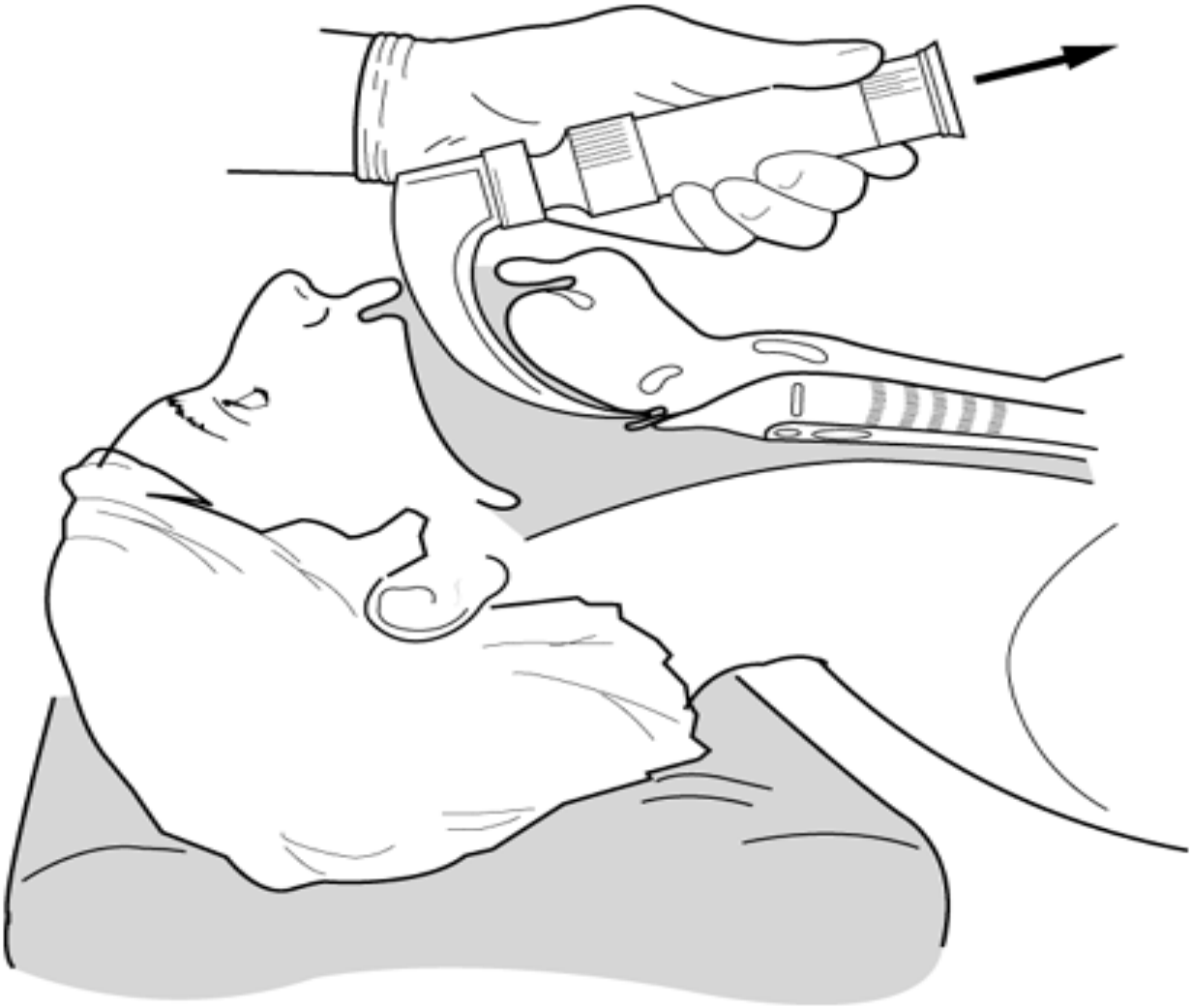
INTUBATION WITH MACINTOSH LARYNGOSCOPE[9]:

Proper preparation for intubation should include airway assessment, checking airway equipments and finally achieving sniffing(magil's) position. Positioning the height of the table at the level of laryngoscopist's umblicus helps to achieve a straight line between the operator's eye and the patient's upper airway.

While the right hand thumb and index finger open the oral cavity ,the macintosh blade should be held with the left hand. Laryngoscope blade should be introduced in to the right side of the patient's oral cavity without engaging the lips and teeths. When half of the blade is introduced in to the oral cavity the tongue should be swept to the left as laryngoscope blade is moved to the centre.

On deeper entry into the oral cavity, the blade tip is positioned between the base of the tongue and the pharyngeal surface of the epiglottis at vallecula. At that stage the tongue and pharyngeal soft tissues are lifted by blade by elbow movement not by wrist to expose the glottis opening (vocal cords)

Figure 5:Intubation with macintosh laryngoscope



DESCRIPTION OF AIRTRAQ OPTICAL LARYNGOSCOPE[14]:

The design of Airtraq optical laryngoscope is such as to provide a view of the laryngeal aperture . It does not need oral, pharyngeal and tracheal axes alignment. Because it had an exaggerated curvature of blade. It is made of medical grade plastic material. The blade of the Airtraq laryngoscope consists of two separate channels side by side. One channel for the placement and insertion of the endotracheal tube, and the other side channel distal end contain a distal lens . And also this distal end contain a battery operated light. The thickness of the adult size 3 blade is 18 mm.The image of the gllotic structure is seen in the proximal viewfinder by using a combination of lenses and prisms. The proximal lens allows visualization of the glottis and surrounding structures and the tip of the endotracheal tube.

The Airtraq is available as varies sizes like 0,1, 2,and 3,which accommodate standard endotracheal tubes of all sizes . Adult size 3(blue colour) accommodate endotracheal tube with internal diameter 7.0 to 8.5mm. A minimum mouth opening required for adult airtraq is 18mm. A clip-on wireless video system is also present for viewing on an external screen like laptop or TV moniter. This is useful for medical records and teaching purposes.

Figure 6:Airtraq laryngoscope

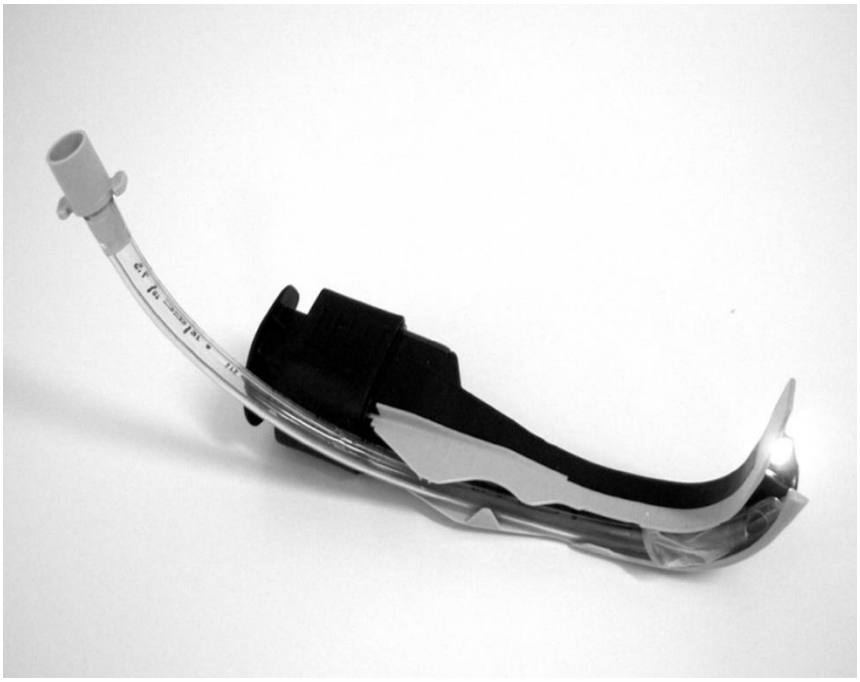


Figure 7: Vocal cords view from Airtraq

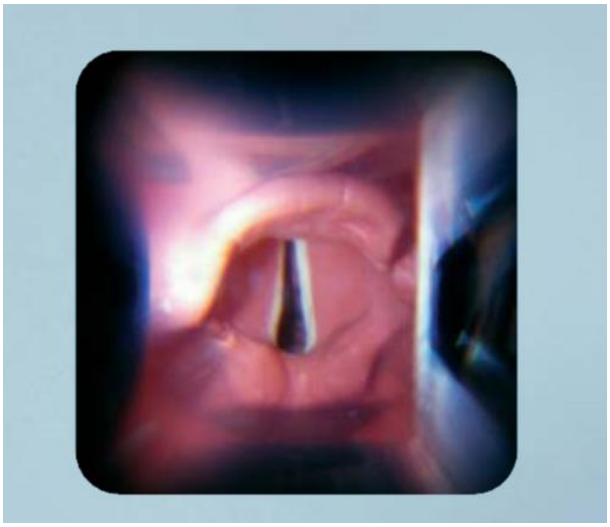
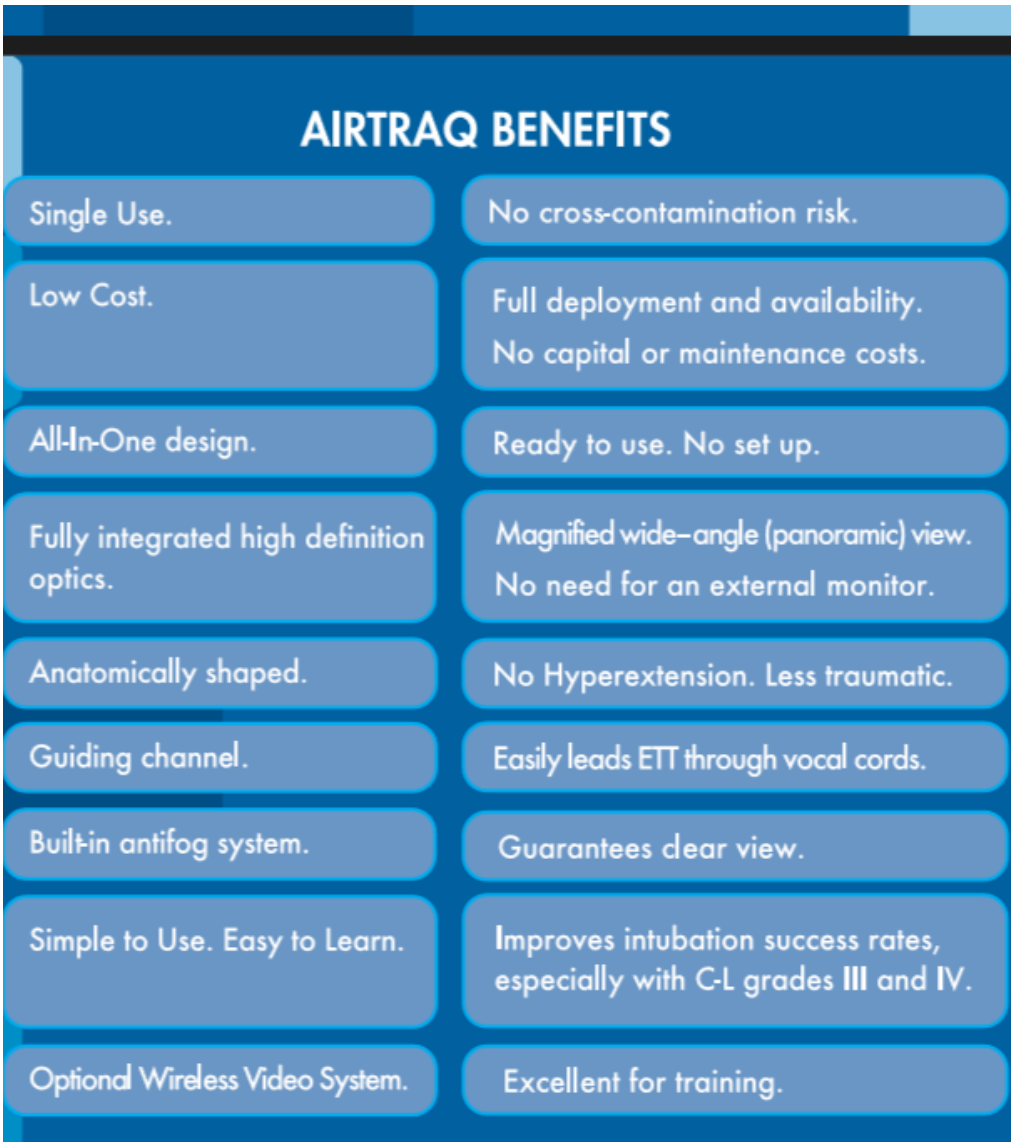


Figure 8: various Airtraq size

AIRTRAQ SIZES

DESCRIPTION AND CODE	ET TUBE SIZES	MOUTH OPENING	COLOUR
REGULAR Size 3 A-011	7.0 To 8.5	18 mm.	Blue
SMALL Size 2 A-021	6.0 To 7.5	16 mm.	Green
PAEDIATRIC Size 1 A-031	4.0 To 5.5	12.5 mm.	Purple
INFANT Size 0 A-041	2.5 to 3.5	12,5 mm.	Grey
INFANT NASAL A-051	Not Applicable	12,5 mm.	White
NASO TRACHEAL intubations A-061	Not Applicable	18 mm.	Orange
DOUBLE LUMEN Endobronchial tubes A-071	35 To 41 Fr. Left and Right Standard and Hooked	19 mm.	Yellow

Figure 9: Benefits of Airtraq



USES OF AIRTRAQ LARYNGOSCOPE[15]:

Airtraq laryngoscope device is activated thirty seconds before use . It was activated by pressing the on and off button present on the left side of the proximal viewfinder .The light is switched on and it warms up the distal optical system thereby fogging is prevented. The antifogging mechanism is fully activated when light on the distal end stop blinking. The selected endotracheal tube is then placed into the side channel for ET tube and the tip of the tube aligned with the distal optical system.

The Airtraq laryngoscope is inserted in to the midline of mouth. The curved blade is then slided around the tongue into the posterior surface of pharynx. After attaining adequate depth of insertion is determined by the vallecula. The Airtraq larngoscope's main body reached to the vertical plane after that visualization of glottis structures is attempted in the proximal viewfinder. The blade of aitraq is sometimes slightly elevated against the dorsal surface of the tongue with less upward pressure for indirectly lifting the epiglottis.

When the laryngeal aperture with vocal cords are seen in the center of the proximal viewfinder , the endotracheal tube is gently advanced from the tube-guided side channel to trachea through the vocal cords. In case of difficulty in insertion, the blade is slightly withdrawn, elevated, and/or rotated to the right or

left side and endotracheal tube insertion is repeated and is inserted into a midtracheal position. After visual and $ETCO_2$ confirmation of correct placement, the endotracheal tube is secured at its proximal end and disengaged from the tube-guide channel and the Airtraq is taken out by rotating the unit forward back and gently lifting it out from the oral cacity.

Figure 10: Intubation method by Airtraq laryngoscope

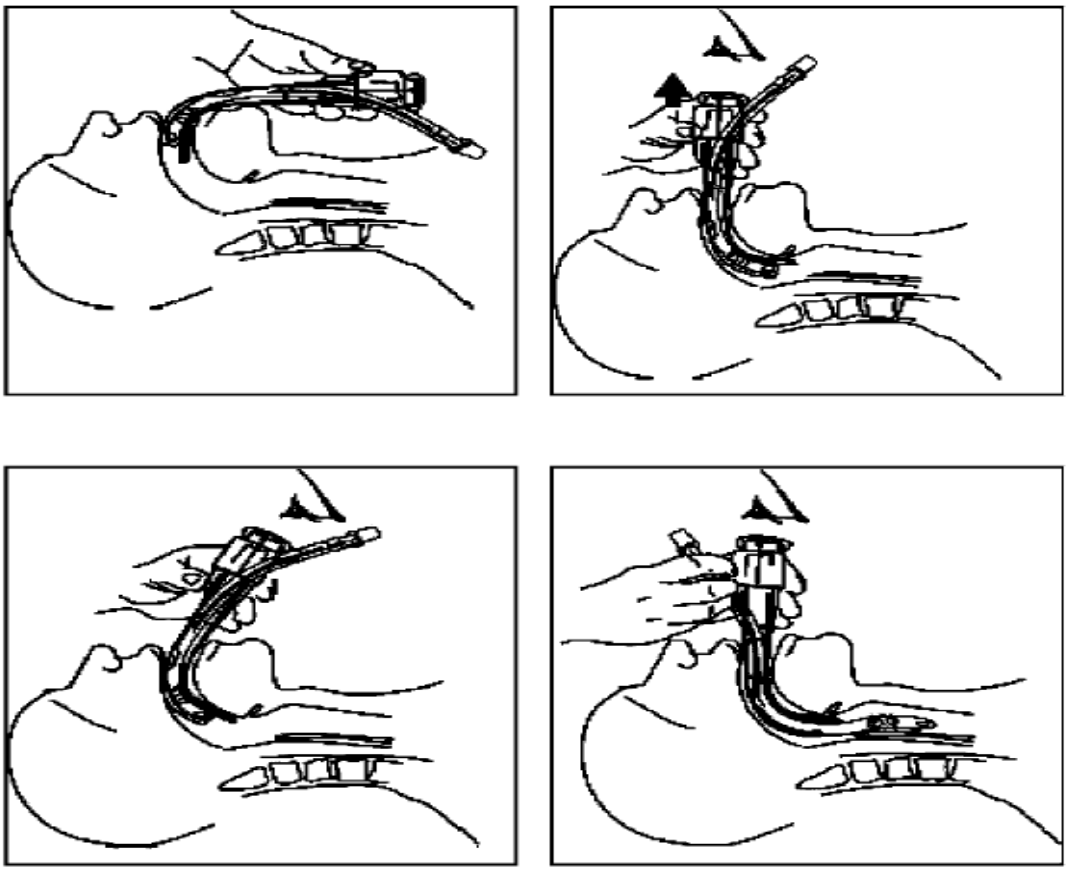
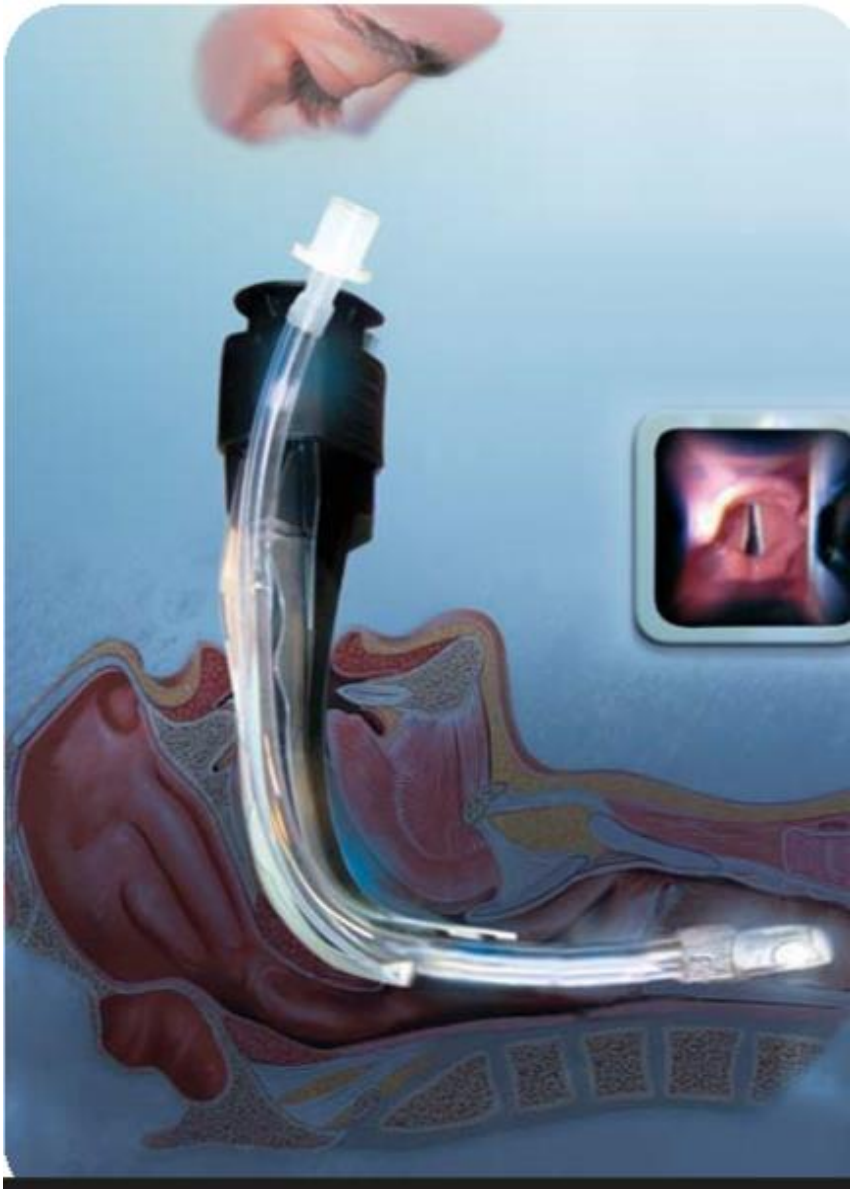


Figure 11: Intubation with airtraq



REVIEW OF LITERATURE

REVIEW OF LITERATURE

Literature related to airtraq was searched in google ,pubmed, medknow and metascape search engines using keywords like airtraq, laryngoscope and tracheal intubation from articles year 2006 to till date.The literature was searched and reviewed to seek for advantages and the problems related to Airtraq laryngoscope aided intubation techniques.

1. Chrisen H. Maharaj , Brian.H.Harte, Elma Buckley and John.G.Laffey, University College Hospital, Galway, Ireland, conducted study on "Endotracheal intubation in patients with cervical spine immobilization- A comparison of Macintosh and Airtraq optical laryngoscopes" in 40 patients and they concluded that the Airtraq have less intubation duration than macintosh (mean 13.2 seconds vs 20.3 seconds with Macintosh), additional maneuvers are less needed , and less intubation difficulty scale score(0.1 vs 2.7). endotracheal intubation with the Airtraq laryngoscope cause less hemodynamic response for laryngoscopy than macintosh [(16)].

2. Yoshihiro Hirabayashi and N. Seo, Department of Anaesthesiology, Jichi Medical University, Tochigi, Japan conducted a study on 20 patients

where nasotracheal intubation was performed by a non-anaesthesia physician with 1-2 months of airway management training and compared the intubating conditions between Macintosh and Airtraq laryngoscopes. They concluded that nasotracheal intubation was done in 65 seconds (mean) using Airtraq laryngoscopy, while it required a significantly longer time of 123 seconds (mean) using Macintosh laryngoscopy with Magill forceps. All the patients in Airtraq laryngoscope group experienced successful tracheal intubation, but one resident performed an esophageal intubation in the Macintosh laryngoscope group. They found from the study that in comparison with the Macintosh laryngoscope, the Airtraq provides superior and easy intubation conditions for personnel who are in airway management training, which results in less time to secure the airway with endotracheal tube[17] .

3. S.K.Ndoko, , L.Tual, R.Amathieu ,C.Polliand, L.El.Housseini, and W.Kamoun ,Anasthesia and Intensive Care department, Jean Verdler Public University Hospital, Paris, France, conducted a study on "Tracheal intubation of morbidly obese patients: a randomized trial comparing performance of Macintosh and Airtraq laryngoscopes" in 106 morbidly obese patients undergoing surgery and found that in the Airtraq optical

laryngoscope group, endotracheal intubation was successfully performed in all the patients within 120 seconds but in the Macintosh group six patients intubated in more than 2 mins duration. Thsese six patients are subsequently intubated with the Airtraq laryngoscope within the mean time taken for tracheal intubation was 24 seconds.The mean intubation duration is 24 seconds for the Airtraq laryngoscope and 56 seconds for Macintosh laryngoscopes. Fall in saturation was seen in one patient in Airtraq group and nine patients in the Macintosh laryngoscope group (demonstrating drops of SpO2 to 92% or less). They found from the study that the Airtraq laryngoscope less intubation duration of endotracheal tube and less fall in oxygen saturation (Spo_2) in morbidly obese patients[18].

4. Schirin M.Missaghi, Klaus Kraser, Hildgard Lackner, Anita Moser and Ernst Zadrobilek, Department of Anaesthesia and Intensive Care, Empress Elisabeth Hospital of the city of Vienna, Austria conducted a study on " The Airtraq Optical Laryngoscope: Experiences with a new disposable device for orotracheal intubation." 214 patients undergoing elective thyroid surgery were investigated. Patients with previous history of difficult conventional endotracheal intubation, obesity and anatomic malformation predictive for difficult direct laryngoscopy and tracheal intubation were

given inclusion criteria for this study. Cormack Lehane View was obtained with a Macintosh laryngoscope with gentle lifting force without external laryngeal manipulation . The gllotic views obtained with the Airtraq were evaluated and the tracheal tube was placed and advanced through the laryngeal aperture. Cormack Lehane grade 1\2\3\4\5 were obtained in 74\62\44\32\2 patients respectively in conventional laryngoscopy. The success rate of Airtraq laryngoscope assisted endotracheal intubation at the first attempt was 97% (207/214) with laryngeal views of CL grade 1 in all of these patients. Minor difficulties and problems with impeded blade insertion and impeded tracheal tube insertion were encountered in 9 and 12 percent respectively. 7 patients required a 2ndattempt for tracheal intubation; the causes were failed identification of anatomical malformation in one patient, failed endotracheal tube advancement through the gllotic opening in 4 patients, and requirement of small size endotracheal tube for unimpeded and atraumatic laryngeal passage in 2 patients. In all patients, Airtraq assisted endotracheal intubation was successful in maximum of 2 attempts. They found from the study that provided formal instruction, successful tracheal intubation with Airtraq carried out by novice users was not affected by Cormack Lehane View. The Airtraq proved to be uniquely useful for routine and difficult laryngoscopy and endotracheal intubation[(19)].

5. A study titled " Evaluation of intubation using the Airtraq or Macintosh laryngoscope by anaesthetists in easy and simulated difficult laryngoscopy- a manikin study" was conducted by C.H.Maharaj, B.H.Harte, B.D.Higgins, and J.G.Laffey, University College Hospital,Galway, Ireland in which the Airtraq and Macintosh laryngoscope were compared in simulated easy and difficult laryngoscopy. 25 anaesthetists were allowed to intubate the trachea in 3 attempts by using Laerdal Intubation Trainer in 3 difficult laryngoscopy scenarios followed by using a Laerdal SimMan Manikin in 5 scenarios . Then each anaesthetist performed a endotracheal intubation in the normal airway for a second time to characterize the learning curve. There was no difference between the Macintosh and Airtraq laryngoscope in success of tracheal intubation in the simulated easy laryngoscopy scenarios,. The intubation time at the end of the protocol was significantly less when using the Airtraq laryngoscope rather than macintosh (9.5 secs vs 14.2 secs), demonstrating a rapid acquisition of skills. The Airtraq laryngoscope was more successful in achieving endotracheal intubation, required less time for successful intubation, caused less dental trauma in the simulated difficult laryngoscopy scenarios. And airtraq was considered easy to use by a anaesthetist[20].

6. Zadrobilek.E. et al conducted a study titled " Success of orotracheal intubation with the Airtraq optical laryngoscope in patients with difficult conventional laryngoscopy" this study conducted in 312 patients posted for elective thyroid surgery. They have various conventional laryngoscopic views and another 20 patients with difficult conventional laryngoscopy (CL) also for elective thyroid surgery attempted by using the Airtraq were additionally included in this clinical review. In the study 332 patients evaluated, CL grade 1\2\3\4\5 was obtained in 111\90\61\68\2 patients respectively. The success rate of Airtraq intubation at the first attempt was 98% . All patients successfully intubated by airtraq in a maximum of 2 attempts. 66 out of 70 patients with difficult CL grade 4 or 5 were successfully intubated by airtraq laryngoscope in first attempt,the success rate was 94%. The causes of failures of airtraq tracheal intubation were failed endotracheal tube negotiating to gllotic opening in 3 patients and failed identification of anatomical malformation in one patient. Visualization of the entire gllotic opening was obtained in all patients; small sized tracheal tubes for atraumatic tracheal intubation were required in 2 patients.

7. A study titled " The Airtraq laryngoscope for placement of double-lumen endobronchial tube" was conducted by Y.Hirabayashi and N.Seo, Jichi Medical University, Japan to study the usefulness of Airtraq in the placement of double-lumen tubes. They concluded that the Airtraq was used to intubate with 35 and 37 French double lumen tubes in 10 patients without any complications. A regular size Airtraq allowed 35 and 37 French double lumen tubes, although 37F DLT was somewhat thick against the side channel of the scope. It is probably impossible to kept a 39 French double lumen tube with an outer diameter of 13 mm. They found that despite of this limitation, the Airtraq appears to be an alternative approach for double lumen tube placement in failed double tube intubation by macintosh laryngoscopy cases.[21].

8. A study titled "Comparison of the Airtraq and Truview laryngoscopes to the Macintosh laryngoscope for use by Advanced Paramedics in easy and simulated difficult intubation in manikins " was performed by Sajid Nasim, Chrisen H Maharaj, Ihsan Butt, Muhammad A Malik, John O' Donnell, Brendan D Higgins, Brian H Harteand John G Laffey, Department of Anaesthesia, Galway University Hospitals, Galway,

Ireland in which they compared the efficacy of airtraq and trueview laryngoscope with the Macintosh laryngoscope in direct laryngoscopy in a manikin by a 21 paramedics proficient. Each paramedics took turns to intubate with three types of laryngoscope, in an easy intubation scenario and following a difficult intubation scenario like placement of a hard cervical collar in a SimMan manikin. They found that compared to the Macintosh, the Airtraq reduced the number of optimization maneuvers and less dental trauma when in both the easy intubation and simulated difficult intubation scenarios. In contrast, the Truview laryngoscope increased intubation duration and requires more number of optimization maneuvers, compared to both the Airtraq and macintosh laryngoscope devices[22].

9. Lange.M., Frommer.M., and Redel.A conducted a study titled "Comparison of the Glidescope and Airtraq optical laryngoscopes in patients undergoing direct microlaryngoscopy." In this study, the Glidescope and the Airtraq and were compared in 60 patients with ASA I-III risk, they have upper airway tumours and posted direct endoscopic microlaryngoscopy. Patients were randomly assigned to the Glidescope or the Airtraq group and the Cormack and Lehane grade was found by Macintosh laryngoscopy prior

to endotracheal intubation. There were no differences in between two devices in tracheal intubation success rates and intubation duration . The improvement of Cormack and Lehane grade in 82% cases in Glidescope and 77% of cases in the Airtraq group. Blood stained on the device and airway trauma more common in the Airtraq group . The Glidescope and airtraq laryngoscopes are more valuable device in potentially difficult airways patients .The Glidescope laryngoscope appearing to be less traumatic[23].

10. Emily L.Brown and Ron M.Walls compared the Airtraq , Airway Scope and Macintosh in 4 simulated difficult airway scenarios, normal airway, limited mouth opening, cervical spine rigidity, and pharyngeal obstruction. They concluded that the successful tracheal intubation was significantly higher in the Airway Scope(100%) and Airtraq(98%) rather than with the Macintosh laryngoscope(89%). Mean intubation duration were significantly shorter with the Airway Scope(10.6sec) rather than with the Airtraq(16.2 sec) or Macintosh laryngoscopes (15.8 sec). The mean time for first inflation of the lungs were shorter in airway scope(16.1sec) rather than airtraq (21.6sec) and macintosh(23.5sec). Intubation success rate in

limited mouth opening scenario were significantly higher with the Airtraq (100%) and Airway Scope(100%) than with the Macintosh laryngoscope (83%). Intubation success rates for other scenarios were not statistically significant difference in between these devices[24].

11. Malin.E., Montblanc.J.de., Ynineb.Y., Marret.E., Bonnet.F conducted a case series on the "Performance of the Airtraq™ laryngoscope after failed conventional tracheal intubation" The Airtraq was used in 47 patients with failed macintosh intubation performed by two senior anaesthesiologists in anticipated and unanticipated airway cases. Airtraq laryngoscopy intubation was successful in 36 out of 47 patients (80%). In macintosh laryngoscopy the Cormack and Lehane grade IIb &III in 35 patients, and IV in 12 patients. But in airtraq laryngoscopy Cormack and Lehane score I &IIa in 40 patients, stage IIb &III in 3 patients and stage IV in 4 patients. A gum elastic bougie was used to facilitate to intubate in 11 out of 36 of the cases. Orotracheal intubation was not possible with Airtraq laryngoscope in nine cases. Where five of whom had a pharyngeal, laryngeal or basal lingual tumour. They concluded that in difficult airway patients, following failed conventional oral endotracheal intubation, Airtraq allows securing the

airway in 80% of cases with improving glottic view. However, the Airtraq does not guarantee to intubate in all circumferences, especially in case of pharyngeal and laryngeal obstruction[25].

12. Harald Groeben, Gregor Saint Mont, Roman Pförtner, Ilona Biesler, Anesthesiology & CCM, Clinics Essen-Mitte, Essen, Germany compared intubation using a modified Airtraq for nasal intubation and Standard Macintosh Blade in Difficult Nasal Intubation. 80 patients scheduled for maxillo-facial surgery, requiring nasal endotracheal intubation, with an expected difficult intubation were included for the study and were randomized for intubation with Airtraq laryngoscope (n=40) or Macintosh laryngoscope (n=40) All patients had one or more risk factors for a difficult intubation (mouth opening ≤ 2.5 cm, Mallampati score of IV, documented history of difficult intubation, obvious tumor or swelling). Success rate, visualization of the glottis, time for intubation, and need for optimization maneuvers (cricoid pressure, change of head position, Eschmann stylet, Magill forceps) were evaluated. It was found that intubation with the Airtraq laryngoscope was successful in 37 out of 40 patients while conventional macintosh intubation was successful in 26 out of 40 patients. The

visualization of the glottis according to Cormack & Lahane (22/14/1/3 vs. 4/11/11/14), time for intubation (50±61s vs. 91±50s) and the need for supporting maneuvers (0 to 4 maneuvers: Airtraq 19/10/5/4/0 vs. Macintosh 3/5/11/18/0) were significantly different in favor of the Airtraq technique. Overall, a Magill forceps was not used to advance the tube and could not even been brought close to the glottis in 52 patients. It was concluded that Nasal Airtraq laryngoscope for difficult endotracheal intubations provided a significantly better view of the glottis with less need for optimizing maneuvers. Accordingly, the time for intubation was significantly shorter and the success rate was significantly higher with the Airtraq laryngoscope[(26)]

13. Iwai and colleagues reported success of intubation with airtaq in 1 year 5 month male patients with robin sequence[(27)].

14. Vlatten and soder described the use of airtaq intubation in difficult airway, child with robin sequence with micrognthia, retrognathia and glossoptosis[(28)]

15. Hirabayshi and colleagues reported improve view of glottis and successes intubation with airtraq in 9 year child with treacher-collin syndrome[29].

16. Piraccini and colleagues reported case series of 7 children in whom airtraq was used as a rescue device for intubation, they also recommended airtraq for patients who have Cormack and Lehane grade 3 or 4 when using macintosh laryngoscope or anticipated difficult intubation. They successfully intubated all subjects at first attempt in less than 30 sec[30].

17. Waleed riad and colleagues conducted study on airtraq versus macintosh intubation in pediatric population and the concluded that airtraq intubation decreases intubation time, number of attempts, optimizing maneuvers and less heart rate changes during intubation compared with macintosh laryngoscope[31]

18.. M.C.White and colleagues conducted study on comparson of airtraq with macintosh in infants and children and they conclude that airtraq laryngoscope intubation time was longer in children and infant eventhough significant percentage of glottis opening POGO Score.(p-0.001). POGO

Score is the percentage of glottic opening which was obtained on viewing laryngeal inlet in the direct laryngoscope without cricoid pressure and BURP rated from 0% to 100%[32]

AIM OF THE STUDY

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To compare the intubating conditions in adult surgical patients using airtraq optical laryngoscope with macintosh laryngoscope with respect to

- Ease of intubation
- Time taken for intubation
- Airway trauma
- Response to laryngoscopy

MATERIALS AND METHODS

MATERIALS AND METHODS

This studty was done in Tirunelveli medical college hospital at department of anaesthesiolgy and critical care from January 2014 to may 2014

It was a Single centre , prospective, randomized, parallel group, open label, interventional controlled study

After obtaining institutional ethical committee approval ,40 adult patients**(sample size)** are posted for elective surgery requiring general anaesthesia (**Recruitment)**with satisfying inclusion criteria were enrolled in the study after obtaining informed consent from the patients and relatives.

Randomization **:** 2 groups by random number allotted by computer based randomization

Allocation & intervention : 2 groups

Group A -20 patients –airtraq optical laryngoscope

Group B- 20 Patients –conventional macintosh laryngoscope

INCLUSION CRITERIA

- ASA 1 &2 patients
- Age 18-65 years ,both sexes
- Elective surgical cases requiring GA
- MPC 1,2,&3 patients

EXCLUSION CRITERIA

- Severe CVS,RS, hepatic, renal disease patients
- Any valvular, conduction abnormality, IHD, Hypertensive patients
- Patients on antihypertensive drugs or beta blockers
- Anticipated difficult airway patients
- BMI more than 40

MATERIAL

- Airtraq opitical laryngoscope adult size
- Macintosh larngoscope 3&4 size blade

AIRWAY ASSESSMENT[33,34,35,36]

Previous surgery and anaesthesia records, H/O snoring, H/O voice change, H/O previous surgery, Burns, Trauma, Tumour in and around the oral cavity, neck or cervical spine were asked in the history.

H/O systemic illness like Hypertension, Diabetes, Ankylosing spondylitis, Rheumatoid arthritis were asked and recorded.

General examination included examination for facial anomalies, Anomalies of the mouth, Temperomandibular joint pathology, and tongue, pathology of palate and pathology of nose.

Weight in kilograms and Height in centimeters were recorded and Body Mass Index was calculated.

Individual airway indices were measured

Samson and Young modification of Mallampatti grading[33]:

The patient kept in sitting position with maximal mouth opening with protruding tongue, without phonation and the observer's eye in level with patient's mouth and the degree to which the faucial pillars, uvula, soft palate, and hard palate were visible were recorded and classified as follows:

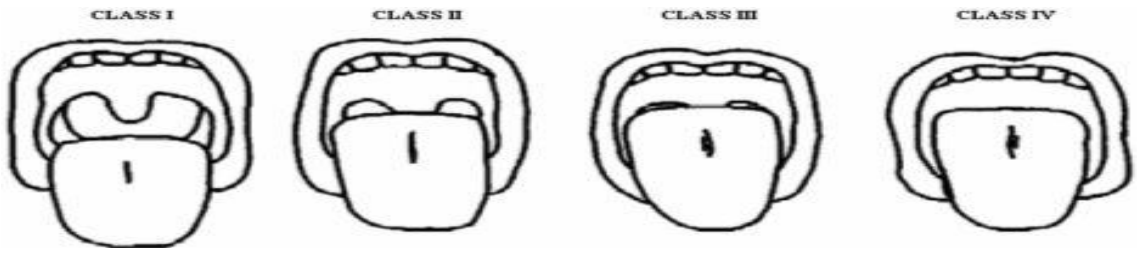
Grade I : Faucial pillars, uvula, soft palate and hard palate visible

Grade II : Uvula, soft palate and hard palate visible

Grade III : Base of uvula or none, soft palate and hard palate visible

Grade IV : Only hard palate visible.

Figure 12:Modified Mallampatti classification



Thyromental distance:

Distance between the thyoid notch and mental symphysis when the neck is fully extended and mouth closed (>6.5cm or< 6.5 cm)

Other ways of airway assessment:

A-O joint movement: Patient asked to look at the ceiling without raising the eyebrow and the range of movements were measured

Neck flexion: Patient was asked to touch the manubrium sterni with chin and the range of movements measured.

TMJ function: The patient was asked to open the mouth wide open and the inter incisor distance measured. Examiner's index finger was placed in front of the tragus and thumb over the mastoid process and the patient was asked to open the mouth and sliding movement of the mandibular condyle was assessed.

Upper lip bite test: The patient was asked to bite the upper lip with the lower incisor and graded as follows:

Class 1 : Lower incisor can bite the upper lip above the vermilion line

Class 2 : Lower incisor can bite the upper lip below the vermilion line

Class 3 : Lower incisor cannot bite the upper lip

Sternomental distance: Distance between the sternal notch and mental symphysis when the neck was fully extended and mouth closed.

Neck circumference: Measured in cm at the level of thyroid notch.

Examination of dentition: Abnormalities like cracking, buck tooth, loose, artificial and absence of incisors were examined and recorded.

PROCEDURE:

After assessment patient shifted to operating room.

i.v line started and $SPO_{2,}$ ECG, NIBP and $ETCO_2$ (After intubation) moniters connected. .

Premedication: 0.2mg glycopyrrolate,2mcg/kg fentanyl iv route 10 mins before induction

Preoxygenation : with 100% 0_2 for 3mins at tidal volume respiration

Base line: SPO_2 HR, Systolic BP , Diastolic BP, MAP was noted

Induction: 2.5 mg /kg propofol

Relaxant for intubation : 70mcg /kg vecuronium

Intubation : airtraq/macintosh laryngoscopy according to the group

Monitoring : SPO_2, HR, Systolic BP , Diastolic BP, MAP every 2 minutes for 10 minutes

OUTCOME MEASURES:

Primary measures:

- Ease of intubation assessed by IDS score

Secondary measures:

- Heamodynamic response
- Airway trauma
- Intubation time

INTUBATION DIFFICULTY SCORE[40] :

Intubation difficulty score was used to evaluate intubating performance of laryngoscopy. IDS scoring was developed by adnet et al in 1997. IDS score is a blend of objective and subjective criteria that permit a quantitative and qualitative approach to the progressive nature of the difficulty in intubation . It appears to be the best indicator till date.

7 variables are used.

N1 - No of supplementary attempts. An attempt is defined as one advancement of tracheal tube in the direction of the glottis during direct laryngoscopy. (for Attempt 1/2/3/4 ,N1 Score is 0/1/2/3)

N2 - No of supplementary operators directly operating (not assisting)(for operators 1/2/3/4 ,N2 Score is0/1/2/3)

N3 - No: of alternative techniques used. (each additional techniques like oral intubation to blind nasotrcheal intubation , curved blade to straight blade etc N3 Score is 1 or more)

N4 - Cormack Lehane grade minus one.

(for CLG 1/2/3/4 , N5 Score is 0/1/2/3)

N5 - Subjectively increased lifting force required during larynoscopy.

(for normal N5=0, for increased N5=1)

N6 - Need for external laryngeal manipulation

(for not required N6=0, for required N6=1)

N7 - Position of vocal cords.(N7 Score 0 for abduction, 1 for adduction)

Total IDS Score = sum of scores (N1 to N7)

Table 1: IDS Score and degree of intubation difficulty

IDS Score	Degree of difficulty
0	Ease
1 to 5	Slight difficulty
> 5	Moderate to major difficulty
infinitive	Impossible intubation

In this scoring the value of IDS is '0' in full visual view of glottic opening with vocal cords are seen to be nicely abducted. Every variation from this defined 'ideal ' intubation increases the scoring that indicate increasing difficulty of intubation. The total IDS score being the sum of all variation from the definition

CORMACK AND LEHANE GRADING SYSTEM:

Entire vocal cord visualized - Grade I

Posterior part of vocal cords seen - Grade IIa

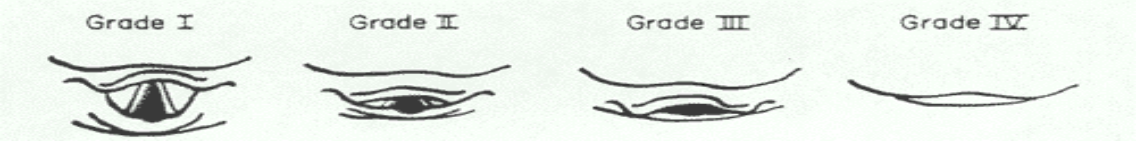
Arytenoids only seen - Grade IIb

Epiglottis only seen (liftable) - Grade IIIa

Tip of epiglottis only seen (adherent)- Grade IIIb

No glottis structure seen - Grade IV

Figure 13:Cormack and Lehane Grading of laryngeal view



Apart from Cormack-Lehane and Intubation Difficulty Score, the following factors were also noted.

- **Intubation time**: It measured from entry of the device into the oral cavity until confirmation of proper placement of tracheal tube.
- **Heart rate, systolic BP ,diastolic BP, mean arterial pressure and SPO_2** were measured every two minutes for 10 minutes from pre induction.
- **Airway trauma**: All complications will be recorded, with special attention to common complications such as upper airway, dental trauma and blood soiling of airtraq or macintosh blade after intubation

If intubation with Airtraq failed and saturation maintained, Macintosh blade was used for intubation and if the saturation decreased, mask ventilation with 100% oxygen followed by intubation with Macintosh laryngoscope.

STATISTICAL ANALYSIS

STATISTICAL ANALYSIS

Data were analyzed with SPSS version 14 (SPSS Inc., Chicago,IL, USA.2011) and Microsoft excel. The alpha error was set at 0.05and type II error was set at 0.20. The independent sample, two-tailed T test or one-way analysis of variance or levene's T test was used for parametric data while Mann–Whitney U test or Chi-square test was used for non parametric data as Appropriate. An P value less than 0.05 was considered statistically significant. Sample size was calculated by using formula $n=(u+v)^2 \times(SD1^2+SD2^2)\div(\mu 1 - \mu 2)$ with atleast 30 sample size needed to detect a difference with more than 80% power of study at 5% significance level.

OBSERVATION

AND

RESULTS

OBSERVATION AND RESULTS

All data were collected and tabulated.

DEMOGRAPHIC VARIABLES:

Mean age, sex and Body Mass Index of the patients in both the group were compared and there was no significant differences in between the groups.

Table 2: Comparison of Age and BMI in both groups

T Test:

PARAMETER ASSESSSED	Group A (AIRTRAQ)		Group B (MACINTOSH)		P value
	Mean	SD	Mean	SD	
Age, yr	38.7	15.81	36.10	14.68	0.593 Not significant
Body Mass Index(BMI)	23.29	5.05	22.47	4.39	0.587 Not significant

Figure 14:Comparison of Age and BMI in both groups

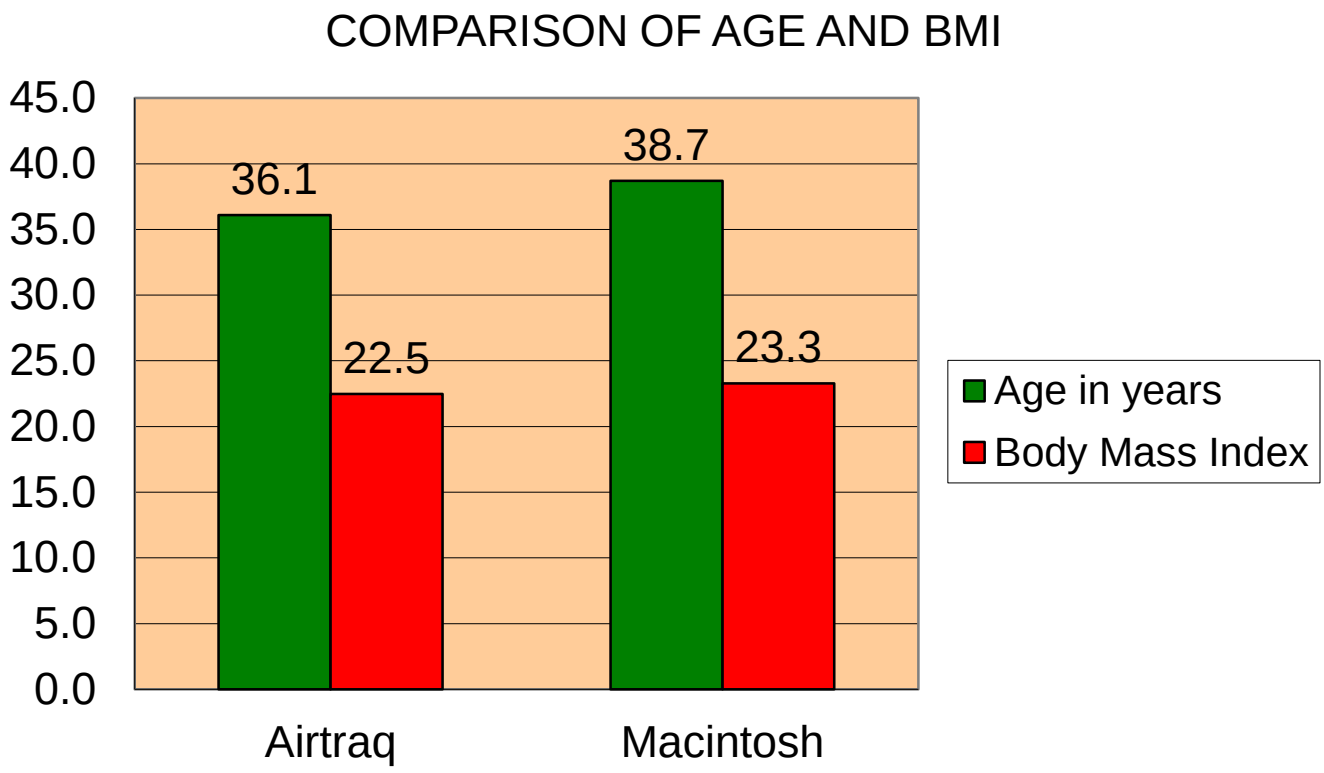
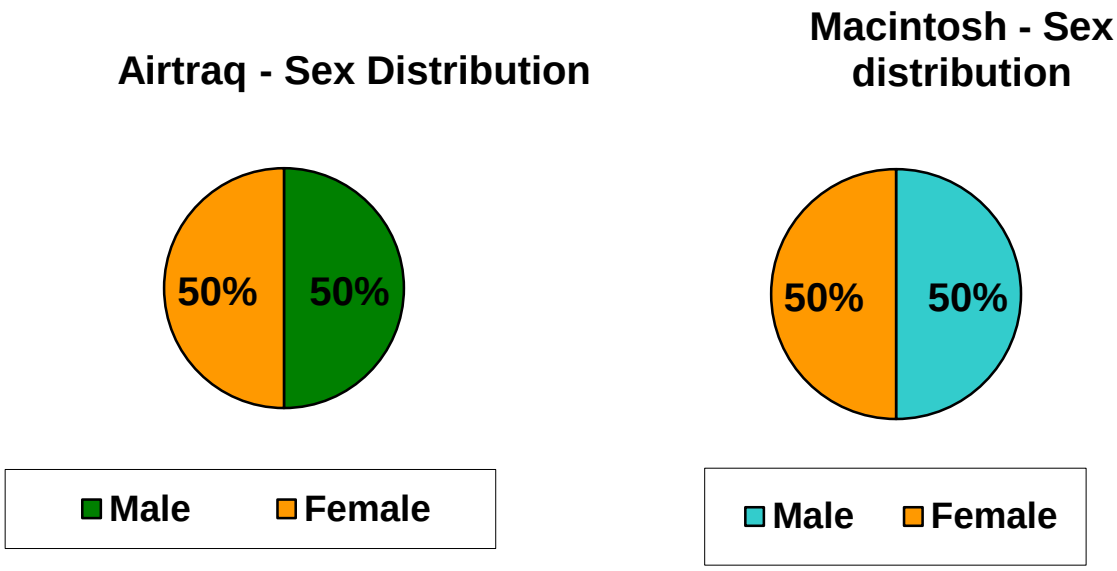


Table 3: Comparison of sex distribution in both groups

Chi – square Test:

Parameter assessed	Group A (AIRTRAQ)		Group B (MACINTOSH)		P value
	Male	Female	Male	Female	
Male, Female distribution	10 (25%)	10 (25%)	10 (25%)	10 (25%)	0.803 Not significant

Figure 15:Comparison sex distribution in both groups



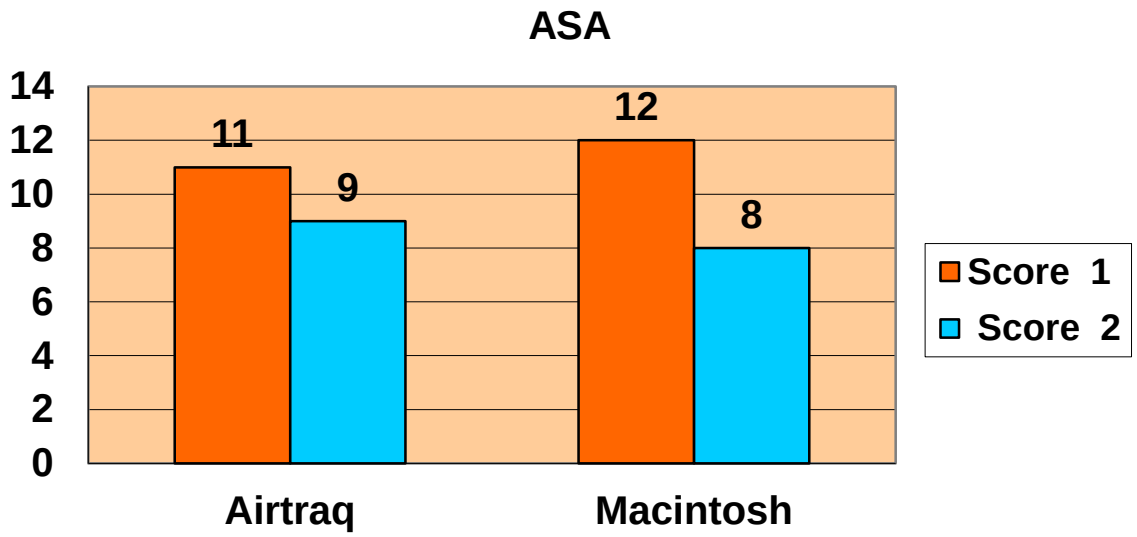
ASA Grading in both groups compared , there was no significant difference in between two groups

Table 4:Comparison of ASA grading in both groups

Chi – square Test:

ASA Grade	Group A (AIRTRAQ)	Group B (MACINTOSH)	P value
1	11	12	0.958 Not significant
2	9	8	
3	0	0	
4	0	0	

Figure 16:Comparison of ASA grading in both groups



AIRWAY MEASUREMENTS:

The airways of both the group of patients were compared with respect to thyromental distance and Mallampatti classification and it was found that there was no statistically significant difference in between the two groups

.

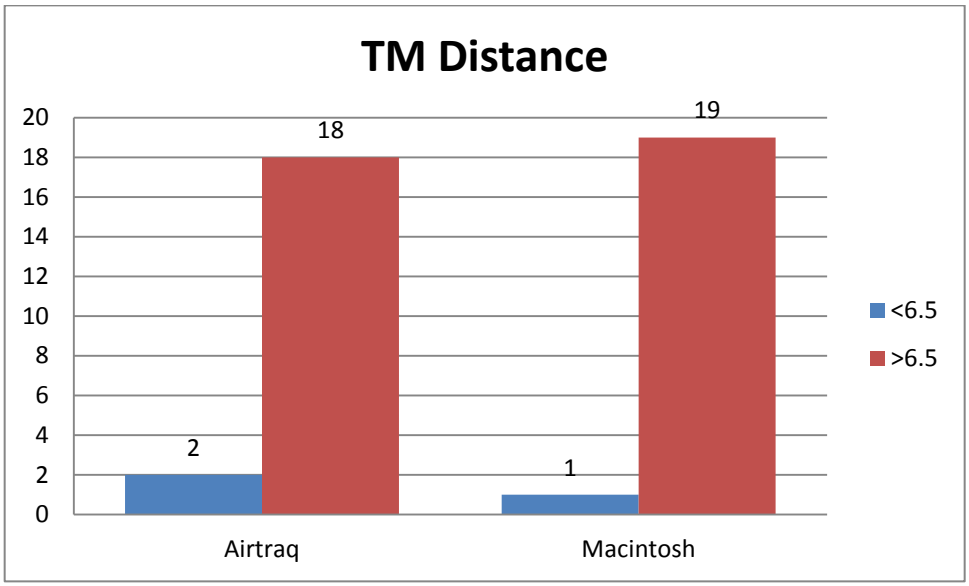
Based on thyromental distance the patients were divided into those with <6.5cm and more than or equal to 6.5cm.

Table 5: Comparison of Thyromental distance in both groups

Chi – square Test

Prameter assessed	Group A (AIRTRAQ)		Group B (MACINTOSH)		P value
Thyro Mental Distance	>6.5cm	<6.5cm	>6.5cm	<6.5cm	0.913
	18 (90%)	2 (10%	19 (95%)	1 (5%)	

Figure 17 : Comparision of Thyromental distance in both groups



Mallampatti grade

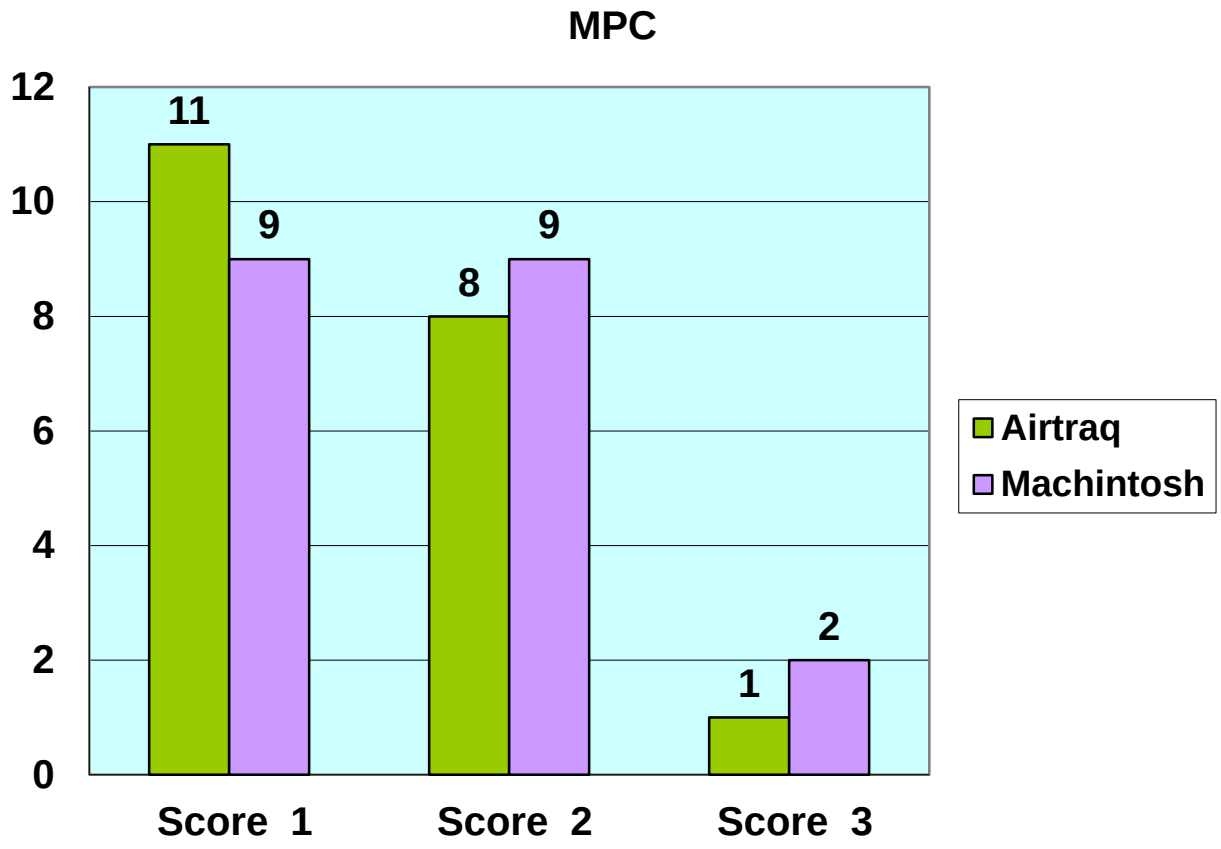
11 patients in Group A and 9 patients in Group B had a Mallampatti class 1. There were 8 patients in Group A and 9 patients in Group B with Mallampatti class 2. Only 1 patient in Group A had a Mallampatti class 3 and 2 patients in Group B had a MPC of 3. No patient selected in either of the group had a MPC of 4.

Table 6: Comparison of MPC Grading in both groups

Chi – square Test:

MPC grade	Group A (AIRTRAQ)	Group B (MACINTOSH)	P value
1	11 (55%)	9 (45%)	0.927
2	8 (40%)	9 (45%)	0.931
3	1 (5%)	2 (10%)	0.967
4	0	0	1.000

Figure 18: Comparison of MPC grade in both groups



OUTCOME MEASURES:

INTUBATION DIFFICULTY SCORE (IDS):

In my study the following IDS parameters where observed

- All the patients in airtraq group intubated in single attempt,in macintosh group 2 patients out of 20 intubated in 2nd attempt**.(N1)**
- All the patients in both groups intubated by single operaters. No need supplementary operaters **(N2)**
- All patients in airtraq group intubated without using additional techniques. But in macintosh group 4 patients out of 20 required additional techniques like changing blade,using stylet and using gum elastic bougie **(N3)**
- Cormack and Lehane grade 1/2/3/4 found in airtaq group 17/3/0/0 patients, in macintosh 10/6/2/2 patients **(N4)**
- Lifting force required in 7 0ut 20 patients in macintosh group,only one patient out of 20 in airtraq group**.(N5)**
- Laryngeal pressure applied in 10 out of 20 patients in macintosh group, 3 out of 20 patients in airtraq group**(N6)**

- In all patients of both groups vocal cord mobility were in abduction **(N7)**

3 patients in the Airtraq group had an Total IDS of more than 1, whereas 10 patients in the Macintosh group had an Total IDS of 1 or greater. In the Macintosh group, 4 patients had an Total IDS of 5 or greater, indicating moderate to severe intubation difficulty, whereas no patient in the Airtraq group had an Total IDS of more than 3. This was computed based on Levene's T test for equality of variances and the result was found to be statistically significant with a P value of 0.0011

Table 7:Comparison of total IDS Score in both groups

Levene's T test:

Group	Total Intubation Difficulty Score									Mean	Std Deviation	P value
	0	1	2	3	4	5	6	7	8			
A	17	0	2	1	0	0	0	0	0	0.35	0.88	0.0011
B	10	0	3	3	0	1	1	0	2	2.05	2.70	

Figure 19:IDS Score of Airtraq group

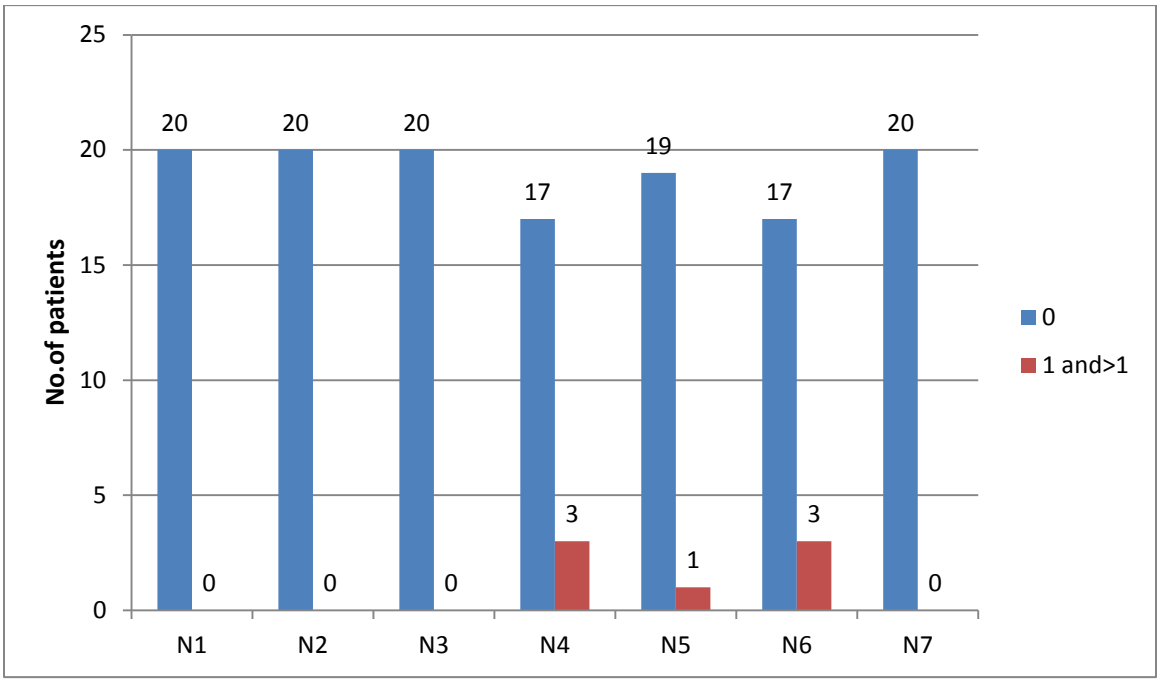


Figure 20:IDS Score of Macintosh Group

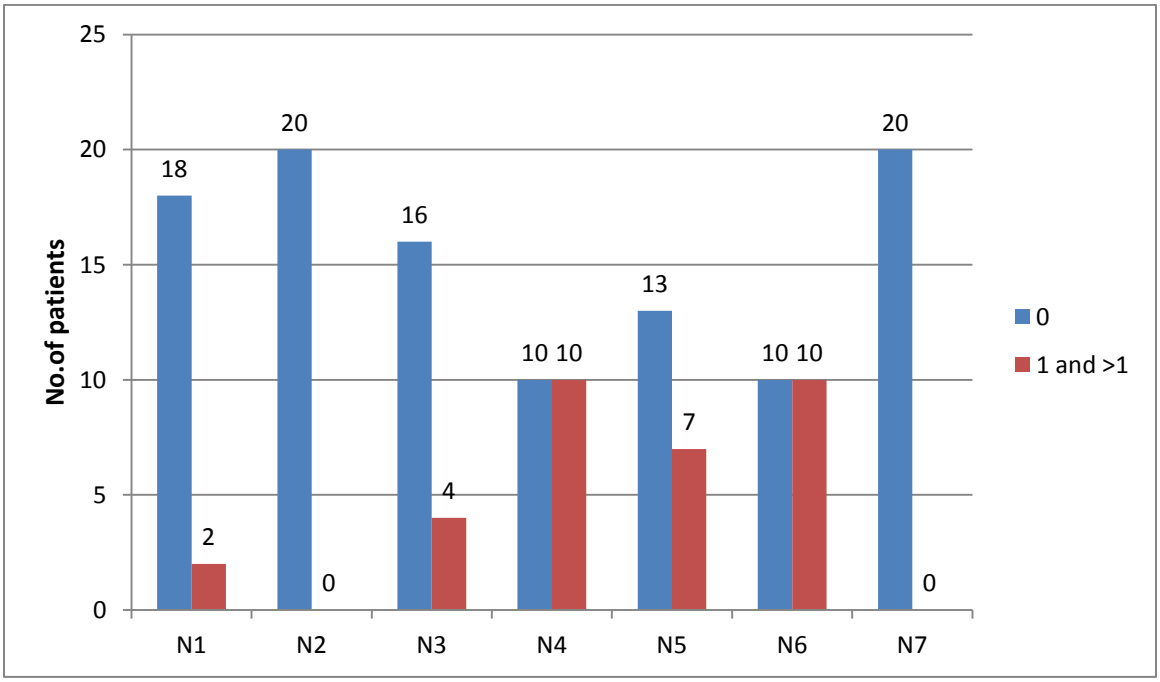
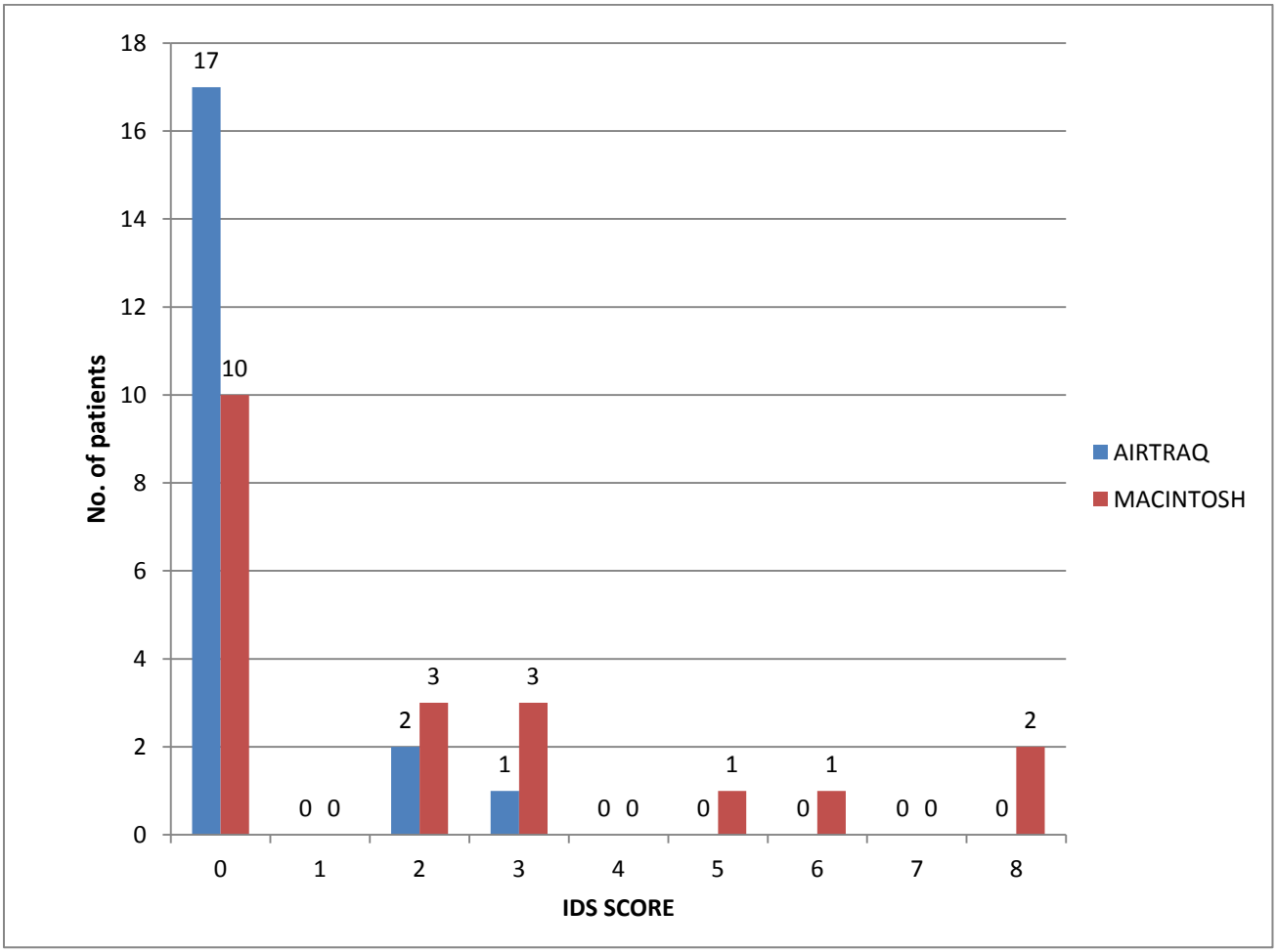


Figure 21:Comparison of total IDS score in both groups



CORMACK and LEHANE grading:

Cormack and Lehane grade of both the group of patients were compared to grade the glottic view.

85% of patients in the Airtraq group had a CL grade of 1, compared to 50% of patients in the Macintosh group.

In the Airtraq group 15% of patients had a CL grade of 2 compared to 30% of patients in the Macintosh group.

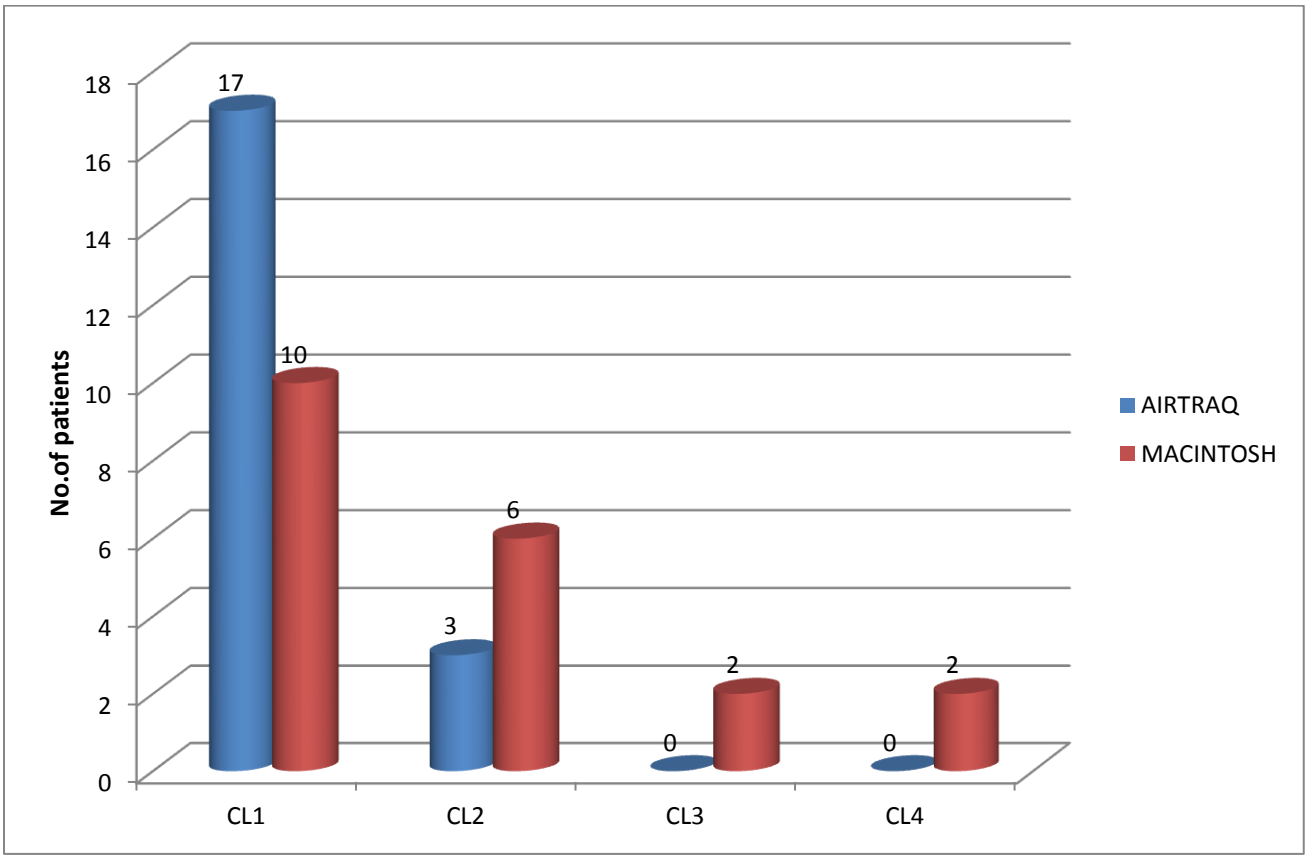
No patient in the Airtraq group had a CL grade of 3 or 4, whereas in the Macintosh group 10% patients had a CL grade of 3 and 10% patients had a CL grade of 4.

Table 8: Comparison of Cormack and lehane grading in both groups

Pearson Chi - square test:

Group	CL 1	CL2	CL3	CL4	P value
Airtraq	17(85%)	3(15%)	0	0	0.0011
Macintosh	10(50%)	6(30%)	2(10%)	2(10%)	

Figure 22: Comparison of Cormack and Lehane grade in both groups



DURATION OF INTUBATION:

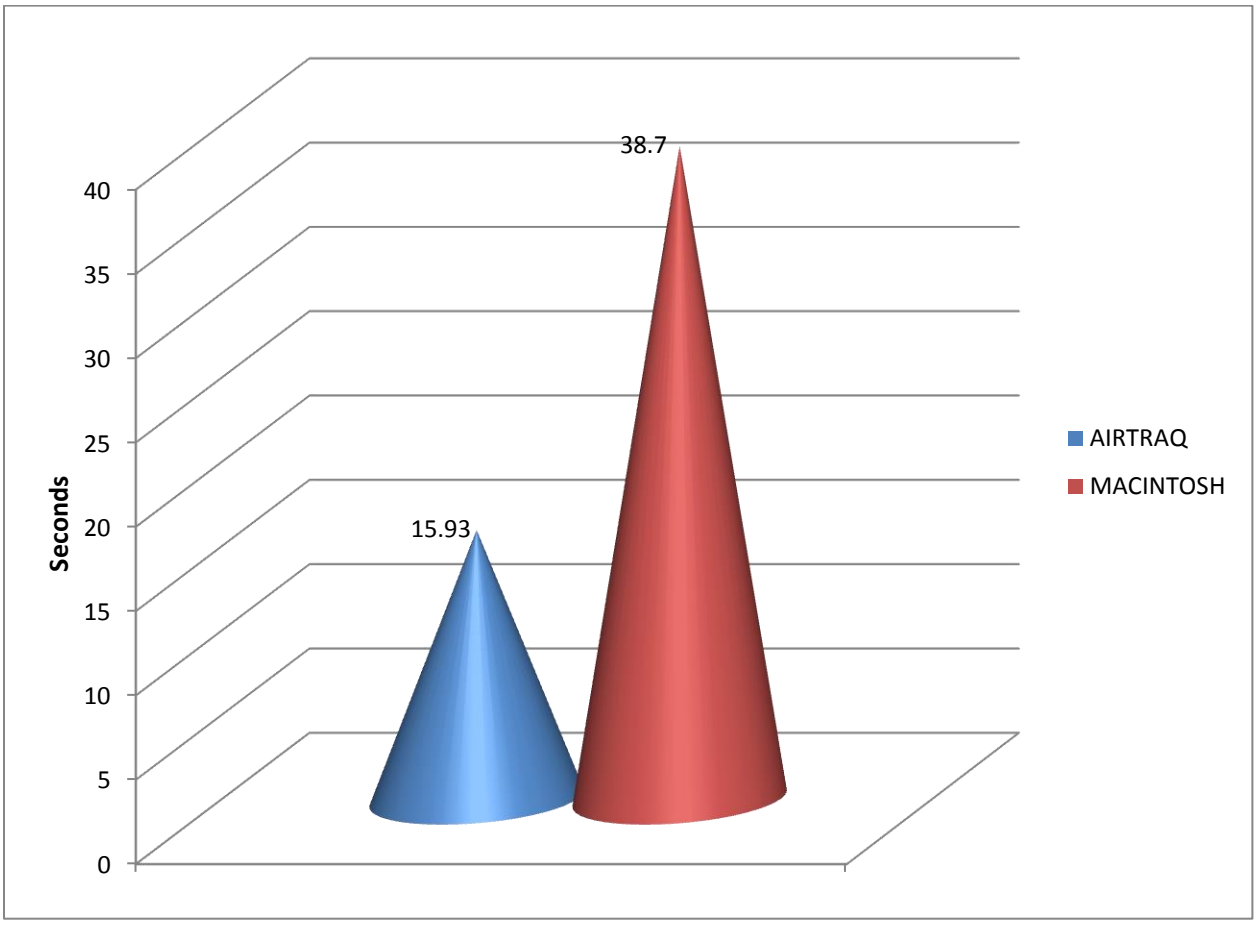
Mean duration of intubation with the Airtraq group was 15.93 secs whereas in the Macintosh group it was found to be 38.70 secs. It was computed using Levene's T test and was found to be statistically significant.

Table 9: Comparison of intubation duration in both groups

Levene's T test:

Parameter assessed	Group	N	Mean	S.D	P value
Intubation time	Airtraq	20	15.93	2.55	0.0001
	Macintosh	20	38.70	15.81	

Figure 23: Comparison of intubation duration in both groups



HEMODYNAMIC CHANGES:

The heart rate, blood pressure and SPO2 of the patients were measured baseline-before induction(0min), before intubation(2nd minute),post intubation (4th minute) and 6thminute, 8thminute and 10thminute post intubation and the values were computed by Chi – square test and it was found that the tracheal intubation with Macintosh laryngoscope resulted in a significant increase in heart rate, systolic, diastolic and MAP, compared with preintubation values, in contrast to the Airtraq.

Table 10:Baseline - hemodynamic parameters in both groups

Parameters	Group	n	Mean	SD	P value
Heart rate	Group A	20	82.65	11.38	0.548
	Group B	20	84.6	8.79	
Systolic BP	Group A	30	126.1	13.98	0.959
	Group B	30	125.5	16.72	
Diastolic BP	Group A	30	78.3	10.33	0.624
	Group B	30	80.4	15.92	
MAP	Group A	30	92.3	21.84	0.483
	Group B	30	96.5	15.02	
SPO2	Group A	30	100	0	1
	Group B	30	100	0	

Table 11: Before intubation-hemodynamic parameters in both groups

T Test

Parameters	Group	N	Mean	SD	P value
Heart rate	Group A	20	81	7.64	0.28
	Group B	20	83.5	6.76	
Systolic BP	Group A	20	124.4	14.05	0.323
	Group B	20	119.8	15.02	
Diastolic BP	Group A	20	77.35	12.99	0.907
	Group B	20	76.9	11.25	
MAP	Group A	20	99.4	24.27	0.072
	Group B	20	86.3	20.34	
SPO2	Group A	20	100	0	1
	Group B	20	100	0	

Table 12: After intubation-hemodynamic parameters in both groups

T Test

Parameters	Group	n	Mean	SD	P value
Heart rate	Group A	20	101.9	9.39	0.001
	Group B	20	115.4	9.03	
Systolic BP	Group A	20	141	15.01	0.021
	Group B	20	155.3	21.83	
Diastolic BP	Group A	20	91.4	12.57	0.709
	Group B	20	93.05	15.07	
MAP	Group A	20	112.1	16.62	0.372
	Group B	20	116.6	14.45	
SPO2	Group A	20	99.4		0.886
	Group B	20	99.2		

Table 13: 6th minute hemodynamic parameters in both groups

T Test

Parameters	Group	N	Mean	SD	P value
Heart rate	Group A	20	94.15	22.47	0.343
	Group B	20	99.4	9.69	
Systolic BP	Group A	20	133.8	12.37	0.038
	Group B	20	144.6	18.91	
Diastolic BP	Group A	20	86.65	12.22	0.744
	Group B	20	84.8	22.01	
MAP	Group A	20	103.3	11.39	0.154
	Group B	20	109.6	15.86	
SPO2	Group A	20	99.8	0.41	0.728
	Group B	20	99.85	0.49	

Table 14: 8th minute hemodynamic parameters in both groups

T Test

Parameters	Group	N	Mean	SD	P value
Heart rate	Group A	20	89.55	7.84	0.674
	Group B	20	91.55	19.55	
Systolic BP	Group A	20	130	9.86	0.744
	Group B	20	131.4	17.03	
Diastolic BP	Group A	20	79.75	9.78	0.223
	Group B	20	84.60	14.53	
MAP	Group A	20	97.9	9.09	0.39
	Group B	20	101.4	15.56	
SPO2	Group A	20	100	0	1
	Group B	20	100	0	

Table 15: 10th minute hemodynamic parameters in both groups

T Test

Parameters	Group	N	Mean	SD	P value
Heart rate	Group A	20	82.4	7.79	0.343
	Group B	20	85.2	10.47	
Systolic BP	Group A	20	126	13.53	0.562
	Group B	20	122.8	20.8	
Diastolic BP	Group A	20	75.65	10.06	0.592
	Group B	20	78	16.3	
MAP	Group A	20	93.6	10.04	0.992
	Group B	20	93.65	18.37	
SPO2	Group A	20	100	0	1
	Group B	20	100	0	

The differences in heart rate, and blood pressure except diastolic BP in both the groups was statistically significant in the post intubation (4th min) measurements, statistically signigicant difference in systolic BP at 6th minute and not statistically significant difference in the 8th and 10th minute post intubation measurement.

The SPO2 changes in the pre and post intubation periods in both the groups was not statistically significant.

Figure 24: Comparison of Heart rate changes in both groups

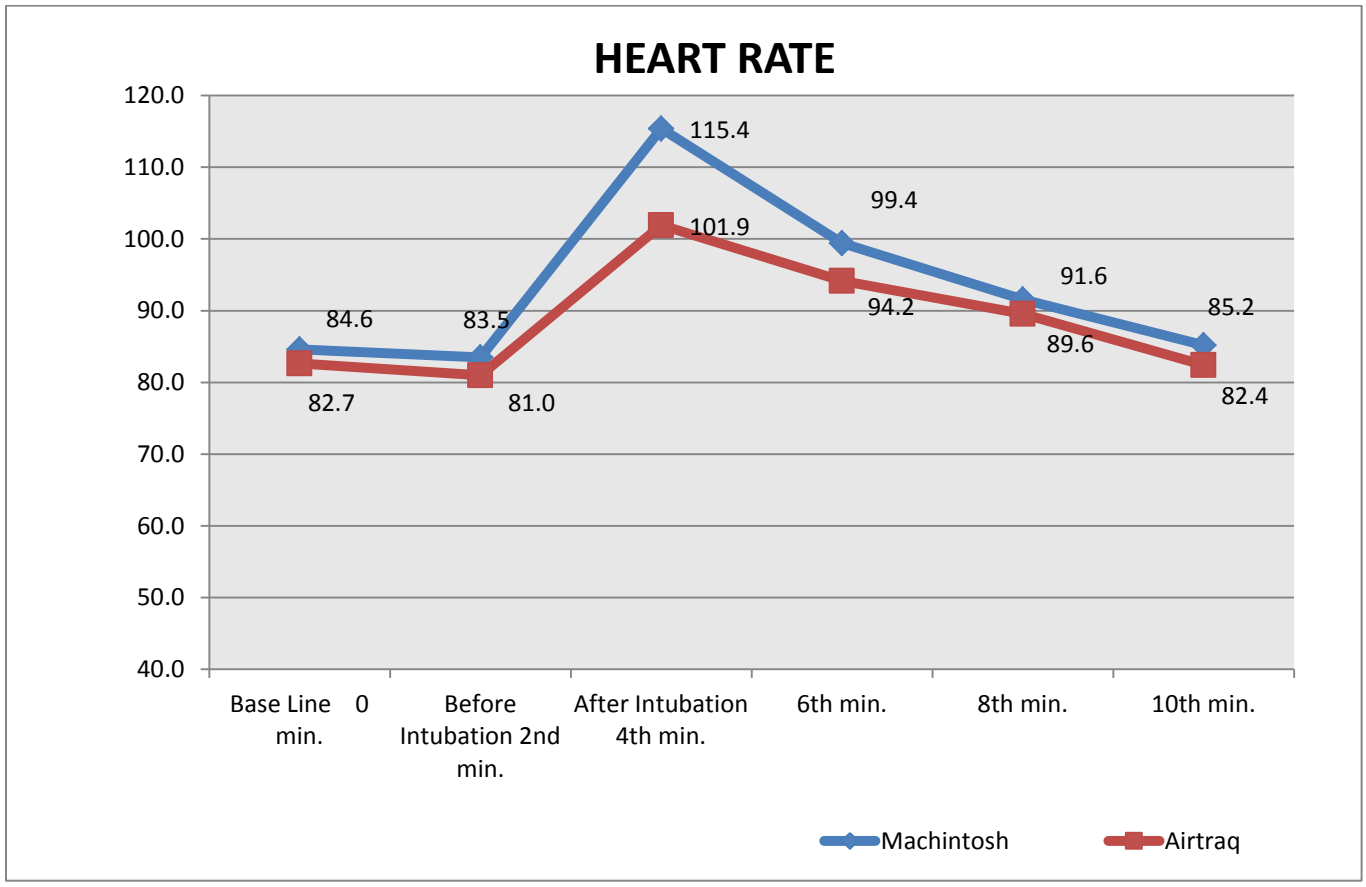


Figure 25: Comparison of MAP changes in both groups

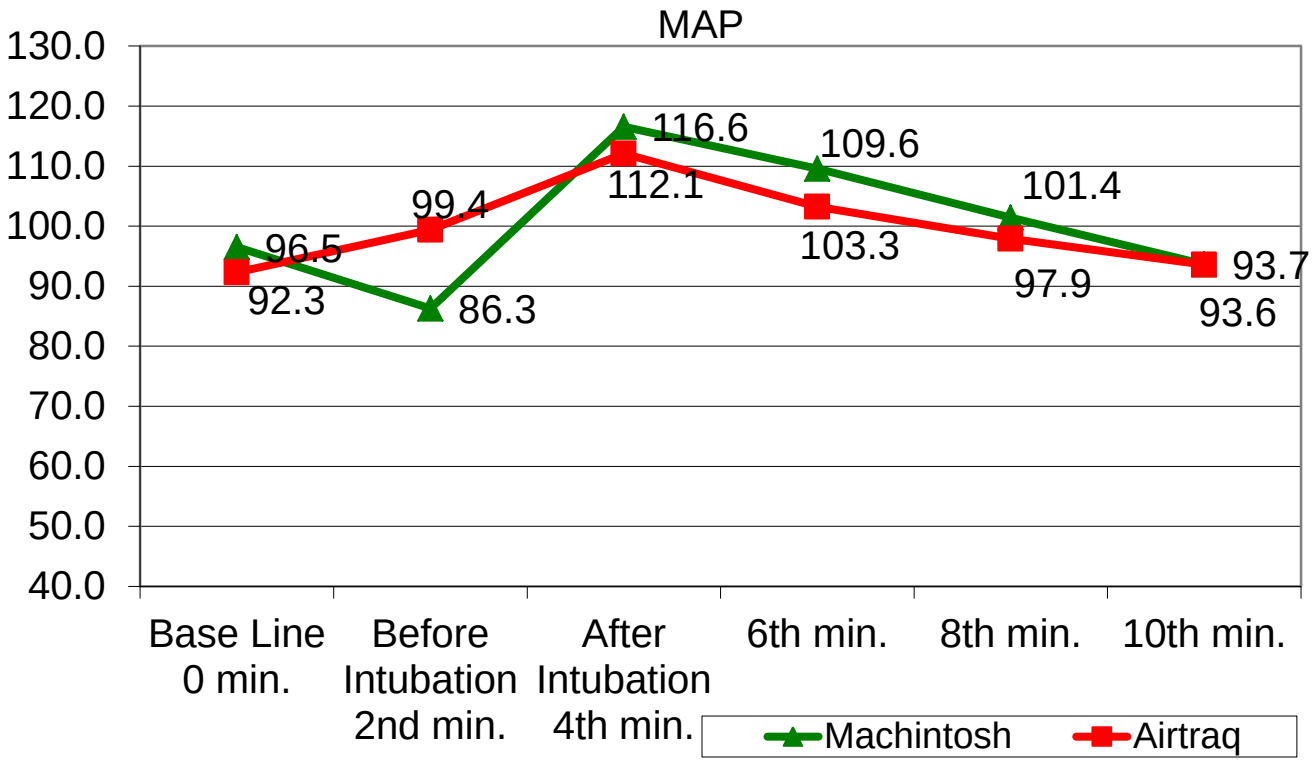


Figure 26:Comparison of Systolic BP changes in both groups

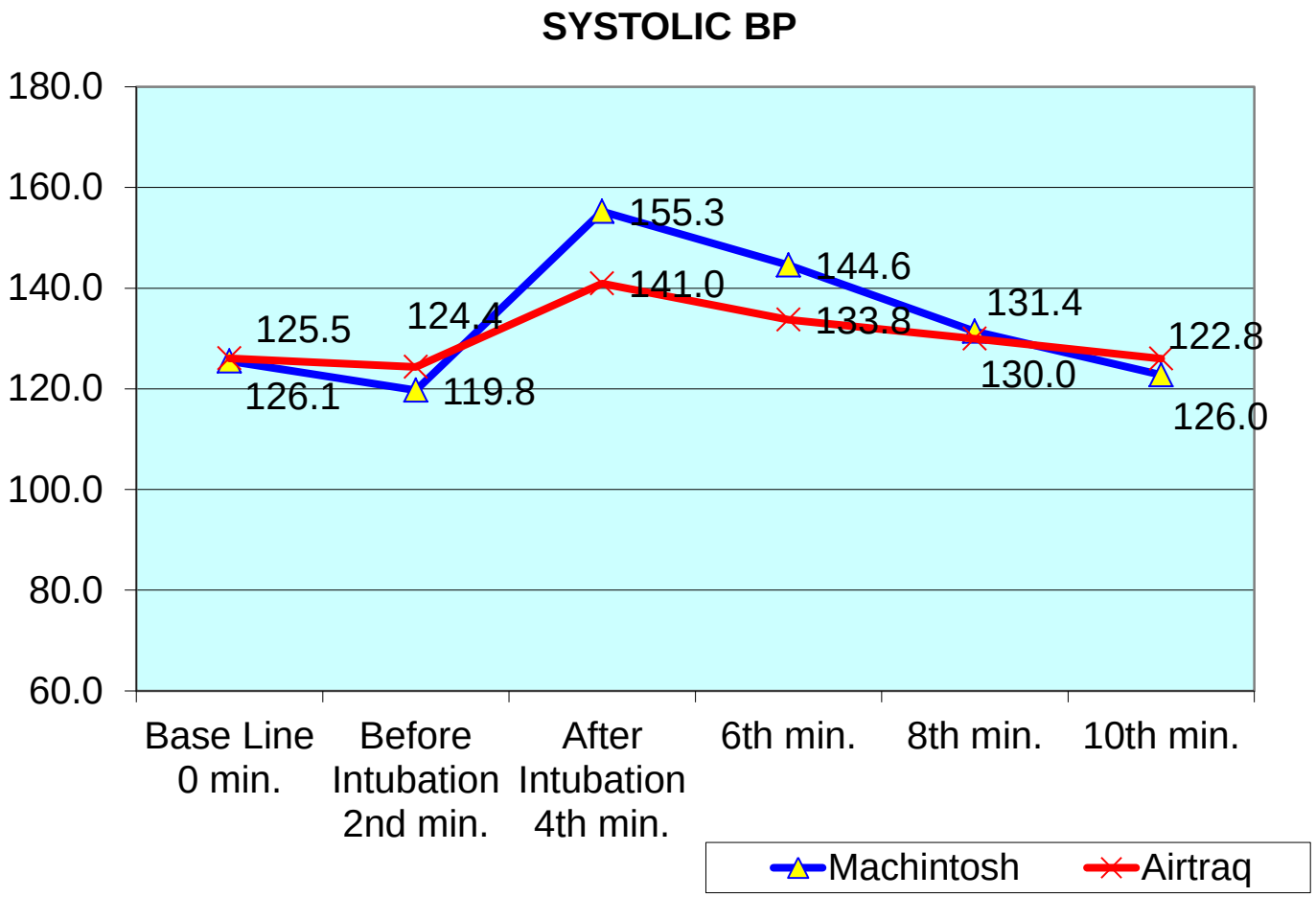


Figure 27:Comparison of Diastolic BP changes in both groups

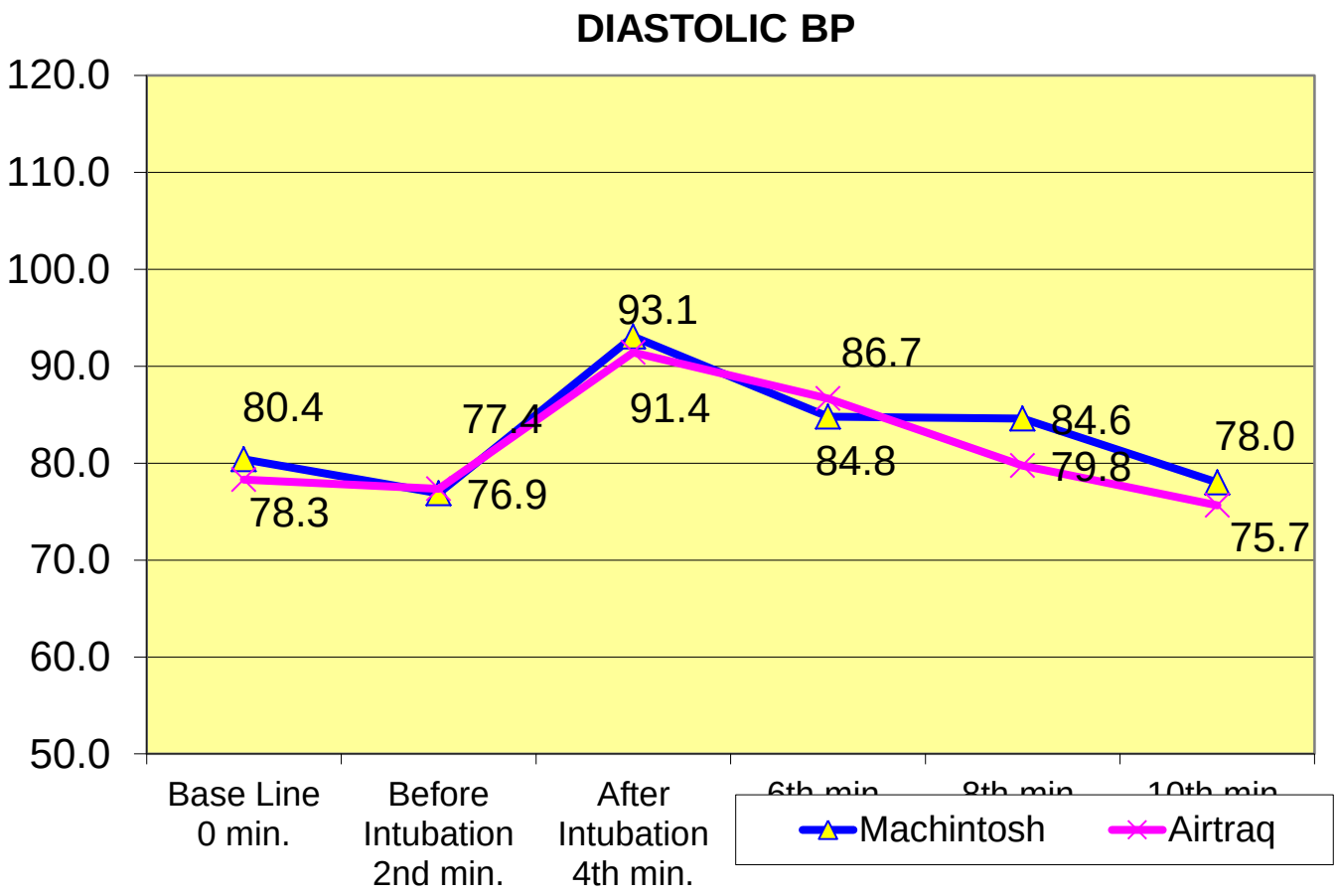
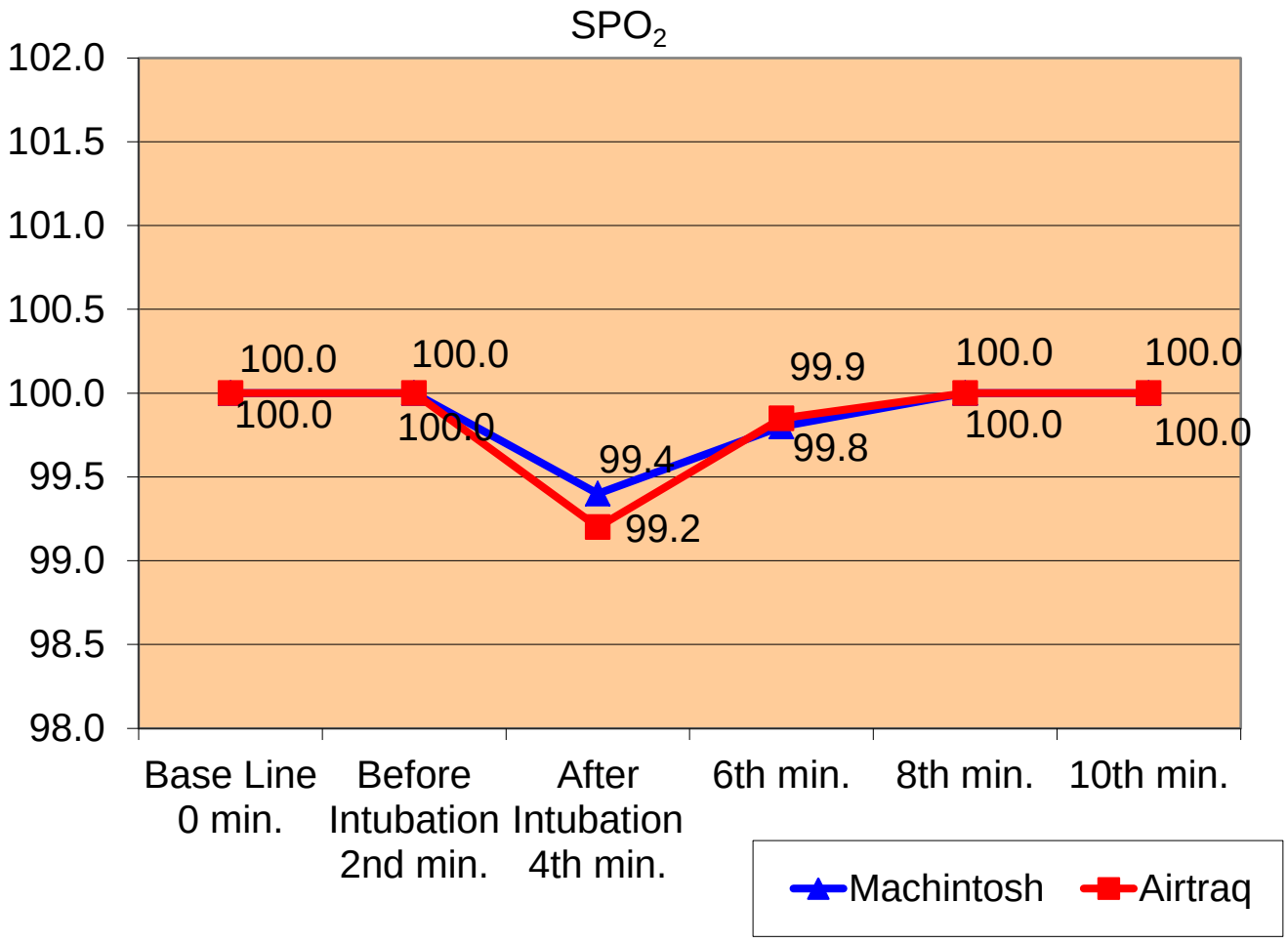


Figure 28: Comparison of SPO_2 changes in both groups



AIRWAY TRAUMA:

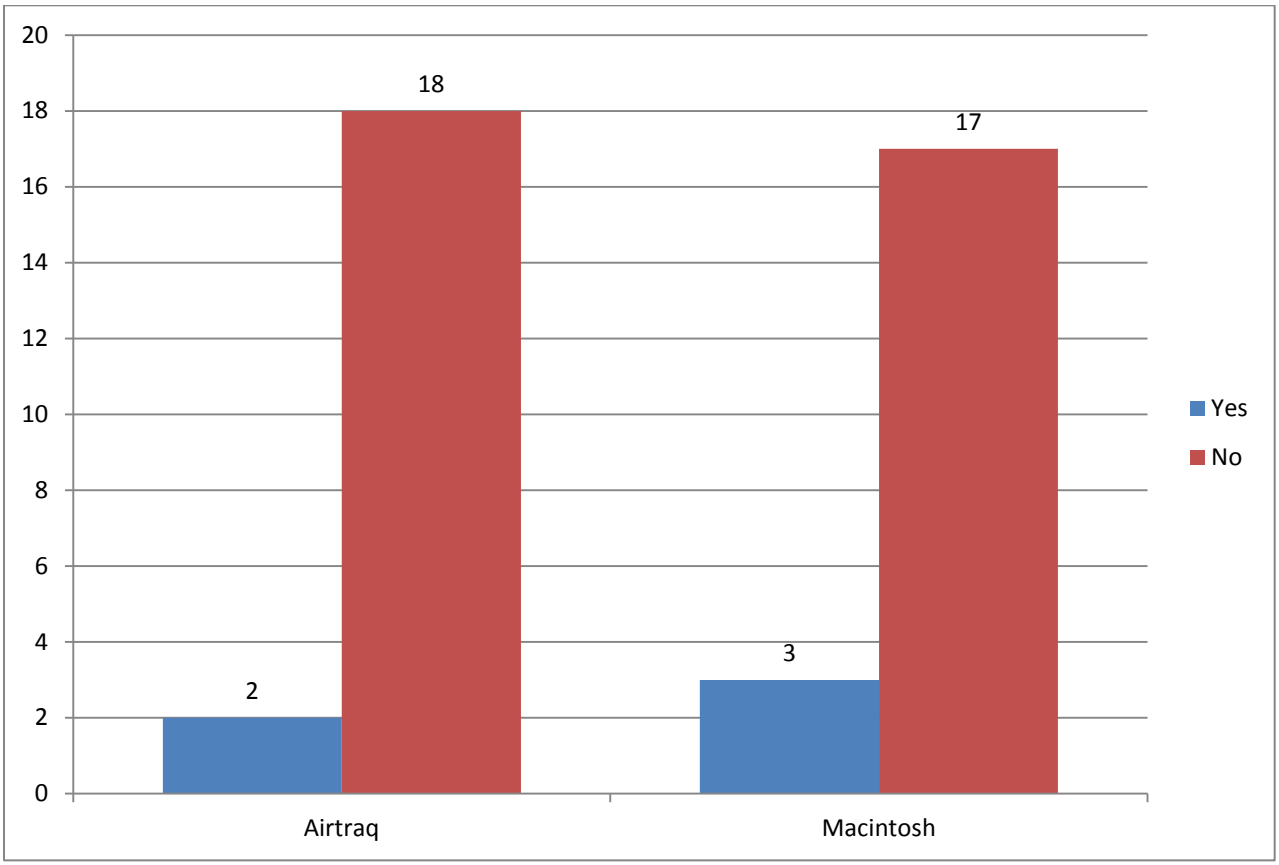
3 patients in the Macintosh group and 2 patients in the Airtraq group experienced trauma to the airways and all the injuries were to the soft tissues and dental injuries airway trauma

Table 16: Comparison of Airway trauma in both Groups

Pearson's Chi – square test:

Group	airway Trauma		P value
	Yes	No	
Airtraq	2 (10%)	18 (90%)	0.958
Macintosh	3 (15%)	17 (85%)	

Figure 29:Comparison of airway trauma in both groups



DISCUSSION

Discussion[37,38,39,40]

Expert airway management is an essential skill for anesthesiologist. Difficult endotracheal intubation is mostly caused by difficult direct laryngoscopy with impaired view of vocal cords. Despite all the information currently available, no single factor reliably predict these difficulties. Unfortunately many difficult intubations are not be recognized until after induction of anaesthesia. Unexpected difficult intubation lead to critical situation, especially who are difficult to ventilate by mask, who are at risk for gastric regurgitation and patients with limited cardiopulmonary reserves.

When a person in supine position and head in the neutral position, the laryngeal axis is almost horizontal. The pharyngeal axis is $30\text{-}45^0$ from the horizontal axis and the oral axis almost perpendicular to the laryngeal axis. For a successful direct laryngoscopy for the exposure of the glottis opening, the oral, pharyngeal and laryngeal axes alignment is required. Elevation of the head about 10cm with pads below the occiput aligns the laryngaeal and pharyngeal axes

Conventional macintosh laryngoscopy fails to get desired laryngeal view in patients with difficult airway like short neck, anteriorly placed larynx, small jaw, MPC 3 & MPC 4 patients, cervical spine immobilization needed patients etc. But

reports said that airtraq have shown improvement in laryngeal view and ease of intubation in normal and difficult airway patients.

The advantages of airtraq optical laryngoscope from the available literatures are

(1) Airtraq does not need alignment of the axes to improve intubating condition because the axis of airtraq is curved and the image is transmitted through lenses and mirrors.

(2) Airtaq is useful in patients with altered airway and magill's position contraindicated patients.

(3) The displayed anatomy is magnified in proximal viewfinder.

(4) The anatomical structure and anomalies are easily viewed with help of airtraq.

(5) Airtraq associated with less hemodynamic changes due to less manipulation of theairway and only clockwise or anticlockwise movement and upwards or downwards movement was required, not theclifiting movement as in macintosh laryngoscope .

(6) Airtraq significantly reduces the duration of intubation.

(7) A clip on wireless video system is also available in airtraq which allows viewing on an external screen. It is also useful for teaching purposes.

(8) Shortens the endotrcheal intubation learning curve in novice personnel.

It was generally easy to insert the airtraq in to the oral cavity, to obtain a full view of the laryngeal aperture and to intubate the endotracheal tube into the trachea without major complication. In airtraq the endotracheal tube can be attatched to the side of the blade and the tip of the ET tube is visible on the proximal viewfinder. Once laryngeal aperture was positioned in the centre of the proximal viewfinder, it was easy to introduce the ET tube into the trachea.

Eventhough we have a good view of glottis there was difficulty in negotiating the ET tube into the trachea, that result in prolonged intubation. The back and up maneuver or clockwise or anticlockwise movement of airtraq was needed to introduce the ET tube into the trachea.

Christen H Maharaj et al conducted a study on comparison of macintosh and airtraq laryngoscope intubation in cervical spine immobilization patients . They concluded that 14 out of the 20 patients in macintosh laryngoscope group had an IDS score of 1 or more, compared with one patient in airtraq laryngoscope

group. In the macintosh laryngoscope group 4 patients had an IDS score of 5 or more indicating moderate to severe intubation difficulty. [41]

In my study total IDS score was '0' in 17 out of 20 patients, score '2' in 2 patients and score '3' in 1 patient in airtraq group. Total IDS score 0 in 10 out of 20 patients in macintosh group remaining 10 patients had IDS score more than 1 with a maximum score of 8 in 2 patients. The findings from my study are comparable to Chiristen maharaj's study.

In Christen H Maharaj's study 19 out of 20 patients intubated with airtraq laryngoscope had Cormack and Lehane grade 1 and one patient had a CL grade 2 when compared to 6/7/7 patients with CL grade of 1/2/3 respectively in the macintosh group[42].

In my study Cormack and Lehane score 1/2/3/4 for airtraq was 17/3/0/0 patients respectively and for macintosh was 10/6/2/2 patients respectively. The difference was statistically significant (<0.05) when analysed with pearson chi square test and paired T test.Cormack and Lahane score 1 was seen in 85% of in the airtraq group which represents best intubating conditions[43].

In the study conducted by christen H Maharaj et al in patients, they found that the mean intubation time for macintosh laryngoscope was 20.3 seconds and 13.2 seconds in airtraq laryngoscope.[16]

In another study conducted by same author in manikins, they found that the mean intubation time with macintosh was 14.2 seconds and with airtraq was 9.5 seconds.[19]

In the study conducted by S.K.Ndoko in 106 morbidly obese patients, the mean intubation time with airtraq was 24 seconds and with macintosh was 56 seconds.[18]

In my study the mean intubation duration for airtraq group was 15.93 secs compared with 38.70 secs for macintosh group.Which was found to be statistically significant applying levene's test.

In the study conducted by Christen H Maharaj et al concluded that increase in mean heart rate and mean MAP following intubation response was high in Macintosh group rather than Airtraq group.

In my study the increase in mean heart rate from the pre induction to post intubation in airtraq group was 20.9 per min whereas in macintosh group was 31.9 per min.The increase in mean MAP from pre intubation to post intubation in airtraq group was 12.6mmHg whereas in macintosh group was 30.3 mmHg.

The above findings suggest that the airtraq laryngoscopy produce less stimulation of heart rate and blood pressure during endotracheal intubation

comparison with the macintosh laryngoscopy. These results show that airtraq provides good glottic view, without the need of alignment of pharyngeal, laryngeal and tracheal axes and less force required to lift during laryngoscopy. These results are similar to christen H Maharaj's study [44].

In the study conducted by Maharaj et al was noted that intubation attempts with airtraq significantly reduced the incidence of airway trauma in simMan manikin and laerdal airway trainer in easy and stimulated difficult airway scenarios during compared to macintosh laryngoscopy. .

In my study minor airway trauma occurred in 2 out of 20 in airtraq group, and 3 out of 20 in macintosh group. Which was to the soft tissues of airway including dental injury, which was not statistically significant

Minor airway trauma is common during laryngoscopy and intubation which occur in lips, tooth, tongue, nose, pharynx, larynx and trachea . The increase of incidence is common in dental anomalies like buck teeth, difficult airway, prolonged intubation, female gender and old ages. Minor airway injuries does not cause major mortality and morbitity, but immediate recognition and management is required[45,46,47 ,48].

My study results show that airtraq have less intubation difficulty score, less Cormack and Lehane score, less intubation duration, less Airway trauma and less

hemodynamic response for intubation than Macintosh. These results are similar to Christen H Maharaj's study

SUMMARY

SUMMARY

In my study Airtraq laryngoscopy had less intubation difficulty score than macintosh laryngoscopy. Airtraq had less Cormack and Lehane grading, less intubation duration, less airway trauma and less hemodynamic response for intubation than Macintosh.

CONCLUSION

CONCLUSION

My study concludes that endotracheal intubation is easier with Airtraq compared to Macintosh laryngoscope as it provide good glottis view. In addition to that Airtraq have less intubation duration, less hemodynamic response for intubation and less Airway trauma compared to Macintosh.

Airtraq laryngoscope significantly improve the view of glottic opening and facilitates fast, easy and reliable intubation.

Airtraq reduce the need of more sophisticated and complex airway instrument like flexible fibreoptic bronchoscope to a particular extent.

It can also be useful in routine anaesthesia management , in critical care, anticipated , unanticipated airway situations.

Due to less hemodynamic response for laryngoscopy for airtraq may have advantage in clinical situation like coronary artery disease or cardiac arrhythmias and neuro surgery patients.

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CONSENT FORM

பொது அறுவை சிகிச்சைக்கு முழு மயக்கம் கொடுக்க சுவாசக் குழாயினுள் மூச்சுப்பெருங்குழலுள் குழாயை பொருத்தக் கூடிய இரண்டு உபகரணங்களைப் ஒப்பீடு செய்வது பற்றிய ஒப்புதல் படிவம்

விளக்கம்:

பொது அறுவை சிகிச்சைக்கு முழு மயக்கம் கொடுக்க சுவாசக் குழாயினுள் மூச்சுப்பெருங்குழலுள் குழாயை பொருத்தக் கூடிய இரண்டு உபகரணங்களின் பயன்கள் பற்றிய ஆய்வாகும்.

வழக்கமாக உபயோகிக்கக்கூடிய மெக்கின்டாஷ் குரல்வளைக்காட்டியும், ஏர்டிராக் குரல்வளைக்காட்டியும் முழுமயக்கம் கொடுக்க பயன்படும்போது எந்த அளவிற்கு உபயோகிக்க எளிதாகவும், குறைந்த நேரத்தில் பயன்படுத்தவும் மற்றும் குறைந்த அளவு இரத்த அழுத்த மாற்றம் வருகிறது என்பதையும் ஒப்பீடு செய்து இந்த ஆய்வின் மூலம் உறுதிப்படுத்த முடியும்.

பயன்கள்:

அறுவை சிகிச்சையின் போது முழு மயக்கம் கொடுக்க மற்றும் உணவுக்குழாயையும் சுவாசக்குழாயையும் பிரித்து வைக்க மூச்சுப்பெருங்குழலுள் குழாயும் அதை சுவாசக்குழாயினுள் பொருத்த குரல்வளைக்காட்டியும் அவசியம் தேவை.

எனக்கு முழு மயக்கம் கொடுக்கும் போதும் குரல்வளைக்காட்டி உபயோகிக்கும் போதும் பின்வரும் விளைவுகள் பற்றி எடுத்துரைக்கப்பட்டது.

- பொதுவாக குரல்வளைக்காட்டியினாலும் மூச்சுப்பெருங்குழலுள் குழாயினாலும் சிக்கல்கள் வருவது அசாதாரணமானது.
- முழுமயக்கம் முடிந்த பிறகு தொண்டை வலி, இருமல், வாந்தி போன்றவை வரலாம். ஆனால் அவை சிறிது நேரத்தில் சரியாகிவிடும்.
- மய்கக மருந்துகளுக்கு சில சமயம் ஒவ்வாமை வரலாம். அவை தேவையான மருந்துகள் மூலம் சரிசெய்யலாம்.
- மூச்சுப்பெருங்குழலுள் குழாய் பொருத்துவதினால் மூச்சு திணறல் மற்றும் குரல் மாறுதல் வரலாம். ஆனால் இவை தற்காலிகமான ஒன்று. தானாகவே சரியாகிவிடும்.
- தொண்டையில் இரத்தம் வருதல், வாயில் இரத்தம் வருதல், மற்றும் பற்கள் உடைதல் போன்றவை வருவதற்கு வாய்ப்புள்ளது. இவை அதற்குரிய சில வழிமுறைகளால் சரிசெய்யப்படும்.
- மூச்சுப்பெருங்குழலுள் குழாய் பொருத்தும் போது இரத்த அழுத்தம் அதிகம் மற்றும் குறைதல் வர வாய்ப்புண்டு. ஆனால் அவை மருந்துகளினால் சரிசெய்யப்படும்.
- புரை ஏறுதலால் ஏற்படும் நுரையீரல் பாதிப்புகள் முழுமயக்கம் கொடுக்கும் போது வர வாய்ப்புள்ளது. ஆனால் அவை மருந்துகளினாலும் மற்றும் சில வழிமுறைகளினாலும் சரிசெய்யப்படும்.

அறுவை சிகிச்சைக்கான ஒப்புதல்:

- எனக்கு நன்கு புரிகின்ற மொழி தமிழில் எனக்கு முழுமயக்கம் கொடுக்கும் முறைநன்றாக விளக்கப்பட்டது.
- தேவையான அல்லது தக்க மயக்க மருந்துகளை எனக்கு உபயோகிக்க ஒப்புதல் அளிக்கிறேன்.
- முழுமயக்கம் கொடுக்கும் முறை காரணம், பின்விளைவுகள், பயன்கள் மற்றும் எனக்கு மாற்று சிகிச்சை முறைகள் பற்றி விளக்கப்பட்டது. நான் அதை புரிந்து கொண்டேன்.
- எனக்கு முழுமயக்கம் கொடுக்கும் போது எதிர்பாராத நிலைமை ஏற்படலாம் என்பது பற்றிய கூடுதல் / எதிர்பாராத சிகிச்சை முறைகள் செய்ய வேண்டி வரலாம் என்பது பற்றியும் விளக்கப்பட்டது. எனவே மருத்துவர் தேவையெனக் கருதும் சிகிச்சை முறைகளை எனக்கு செய்வதற்கு நான் அனுமதி அளித்து விண்ணப்பிக்கிறேன்.
- ஏனக்கு அளிக்கப்படும் இந்த சிகிச்சை முறையை அடையாளம் அல்லது விபரங்கள் தெரியாத வகையில் பிறர் பார்வையிடவும், புகைப்படம், வீடியோ எடுக்கவும் அனுமதிப்பதுடன் அவற்றை மருத்துவத்திற்கும், ஆராய்ச்சிக்கும் பயன்படுத்திக் கொள்ள ஒப்புதல் அளிக்கிறேன்.
- எனக்கு கேள்விகள் கேட்பதற்கு வாய்ப்பு அளிக்கப்பட்டது, அதற்கான விளக்கமும் தரப்பட்டது. இந்த நகல் படிவத்தை நான் படித்து பார்த்து இதன் விபரங்களை அறிந்து இந்த படிவத்தில் கையொப்பம் செய்துள்ளேன்.

நோயாளியின் கையொப்பம்: ----------

பெயர்: ----------

தேதி: ----------

மருத்துவர் தீர்மான அறிவித்தல்:

நான் இந்த முழுமயக்கம் கொடுக்கப்படும் விதம், விளைவுகள், பாதிப்புகள், பயன்கள் மற்றும் மாற்று முறைகள் பற்றி விளக்கியுள்ளேன் என்பதை இதன் மூலம் அறிவிக்கின்றேன். நான் நோயாளிக்கு கேள்வி கேட்பதற்கான வாய்ப்பை கொடுத்து அதற்கு பதில் அளிக்கின்றேன்.

மருத்துவரின் கையொப்பம் : ----------

மருத்துவரின் பெயர் : ---------- தேதி: ----------

சாட்சி விபரம் : ----------

கையொப்பம் : ----------

பெயர் : ---------- தேதி: ----------

PROFORMA

A COMPARISON BETWEEN AIRTRAQ OPTICAL LARYNGOSCOPE AND CONVENTIONAL MACINTOSH LARYNGOSCOPE FOR INTUBATION IN ADULT SURGICAL PATIENTS, A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

PROFORMA

NAME: AGE: SEX: HT: WT: BMI:

DATE: IP NO: ASA:

DIAGNOSIS: PROCEDURE PERFORMED:

HISTORY:

INVESTIGATION: BLOOD HB: SUGAR: UREA: CREATININE:

ECG: X RAY CHEST:

GENERAL EXAMINATION: PR: BP: CVS: RS:

AIRWAY ASSESSMENT: MPC: 1/2/3 TM DISTANCE: > 6.5cm /< 6.5 cm

MONITORING: SPO_2 ECG NIBP ET CO_2(AFTER INTUBATION)

PREMEDICATION: 0.2 mg inj. glycopyrrolate, 2 mcg / kg fentanyl iv route at 10 mins before induction

PREOXGENATION: 100% O_2 6 LITERS FOR 3 MINS

INDUCTION: 2.5mg / kg propofol

RELAXANT FOR INTUBATION: inj. Vecuronium 70 mcg / kg.

INTUBATION: AIRTRAQ OPTICAL LARNGOSCOPE/CONVENTIONAL MACINTOSH LARYNGOSCOPE

HEMODYNAMIC PARAMETERS:

EVENTS	PR	SYST BP	DIAS BP	MAP	SPO_2
BASELINE 0 MIN (PRE INDUCTION)					
2nd MINS (PRE INTUBATION)					
4th MINS (POST INTUBATION)					
6th MINS					
8th MINS					
10th MINS					

INTUBATION DIFFICULTY SCORE:

PARAMETERS	AIRTRAQ IDS SCORE	MACINTOSH IDS SCORE
NO OF ATTEMPTS **N1** 1/2/3/4		
NO OF OPERATERS **N2** 1/2/3/4		
NO OF AITERNATIVE TECHNIQUES **N3** 1/2/3/4		
CORMACH&LAHANE GRADING **N4** 1/2/3/4		
LIFTING FORCE REQUIRED **N5** NORMAL/ INCREASED		
LARNGEAL PRESSURE **N6** NOT APPLIED/APPLIED		
VOCAL CORD MOBILITY **N7** ABDUCTION/ADDUCTION		
TOTAL		

	AIRTRAQ	MACHINTOSH
INTUBATION TIME		
AIRWAY TRAUMA	YES/NO	YES/NO

MASTER CHART

INTUBATION PERFORMANCE IN MACINTOSH LARYNGOSCOPE GROUP

S.No	Age Yrs	Sex	Wt. Kg	Ht. cm	BMI	ASA	MPC	TM Distance cm	PR						SYS. BP					
									Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min.	8th min.	10th min.	Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min.	8th min.	10th min.
1	20	F	42	160	16.4	1	1	> 6.5	86	80	108	102	98	90	120	120	156	137	116	113
2	42	M	65	170	22.5	1	3	> 6.5	88	80	128	17	105	90	127	121	163	149	143	136
3	60	F	55	164	20.4	2	2	> 6.5	80	82	118	108	101	82	149	143	172	158	139	132
4	18	M	72	170	24.9	1	1	> 6.5	76	70	98	90	86	82	145	98	150	133	129	120
5	32	F	51	163	15.2	1	2	> 6.5	72	80	102	82	80	72	123	127	136	122	121	112
6	35	M	76	176	24.5	1	1	> 6.5	86	90	117	101	98	86	147	123	139	147	142	134
7	63	M	60	169	21	2	1	> 6.5	90	90	108	104	94	92	130	131	163	149	135	136
8	20	F	40	160	15.6	1	1	> 6.5	92	86	112	110	16	92	100	106	147	142	100	96
9	43	M	80	170	27.7	2	2	> 6.5	86	88	130	124	112	106	134	137	156	156	150	140
10	25	M	74	172	25	1	3	> 6.5	80	90	120	122	106	112	92	90	134	132	127	91
11	30	F	60	56	24.7	2	2	> 6.5	83	85	104	96	98	80	118	113	131	132	101	98
12	40	F	70	160	27.3	2	2	< 6.5	84	92	114	98	94	82	131	131	199	162	141	145
13	32	M	73	173	24.4	1	1	> 6.5	76	70	117	90	86	78	137	131	149	140	135	101
14	65	M	52	165	19.1	2	2	> 6.5	72	74	112	92	82	74	156	143	199	164	159	156
15	30	F	72	160	28.1	1	2	> 6.5	78	82	110	94	98	68	125	113	156	143	120	120
16	18	F	40	156	16.4	1	1	> 6.5	90	88	120	112	100	90	113	118	131	133	118	113
17	53	M	75	164	27.9	2	2	> 6.5	112	88	120	104	89	80	123	104	195	197	164	156
18	36	F	69	166	25	2	2	> 6.5	90	93	114	114	90	86	129	131	156	162	141	150
19	37	M	75	172	25.4	1	1	> 6.5	86	80	126	108	98	82	101	99	145	116	116	103
20	23	F	48	164	17.8	1	1	> 6.5	85	82	130	120	100	80	116	116	128	118	131	103

INTUBATION PERFORMANCE IN MACINTOSH LARYNGOSCOPE GROUP

Sl. No	DIA.BP						MAP						SPO2						IDS								Intubation Time sec.	Airway Trauma Yes/No
	Base Line 0 min.	Before Intubation 2nd min	After Intubation 4th min	6th min	8th min	10th min	Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min	8th min	10th min	Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min	8th min	10th min	N 1	N 2	N 3	N 4	N 5	N 6	N 7	Total		
1	74	76	112	85	77	70	89	92	130	104	89	83	100	100	100	100	100	100	0	0	0	0	0	0	0	0	17.2	NO
2	82	72	100	93	98	78	99	91	129	115	121	84	100	100	922	100	100	100	1	0	2	3	1	1	0	8	30.6	YES
3	95	97	113	112	99	84	122	13	132	127	112	103	100	100	100	100	100	100	0	0	0	0	0	0	0	0	18.4	NO
4	90	62	100	78	85	74	117	71	117	97	99	89	100	100	100	100	100	100	0	0	0	0	0	0	0	0	18	NO
5	80	80	58	75	74	72	93	95	84	91	91	89	100	100	98	100	100	100	0	0	2	2	1	1	0	6	18.4	NO
6	94	80	99	94	90	85	112	93	112	112	101	100	100	100	99	100	100	100	0	0	0	0	0	0	0	0	17.6	NO
7	78	78	100	93	58	58	101	99	129	115	102	84	100	100	98	100	100	100	0	0	0	1	0	1	0	2	20.4	NO
8	55	61	94	90	58	56	73	79	112	101	72	71	100	100	100	100	100	100	0	0	0	0	0	0	0	0	18.3	NO
9	85	100	102	100	96	96	106	104	121	130	117	112	100	100	90	100	100	100	2	0	1	3	1	1	0	8	29.1	NO
10	48	72	74	79	80	60	67	78	98	99	97	72	100	100	92	100	100	100	0	0	1	2	1	1	0	5	25.1	YES
11	65	70	83	82	69	62	84	83	102	101	81	77	100	100	99	100	100	100	0	0	0	1	1	1	0	3	23.1	NO
12	83	80	99	105	96	90	102	100	122	126	112	117	100	100	99	100	100	100	0	0	0	1	1	1	0	3	28.4	NO
13	85	80	93	84	86	69	104	100	115	107	103	81	100	100	100	99	100	100	0	0	0	0	0	0	0	0	17.9	NO
14	100	97	99	103	105	112	121	113	122	127	129	130	100	100	99	99	100	100	0	0	0	0	0	0	0	0	17.4	NO
15	120	77	70	100	97	74	95	83	121	113	89	89	100	100	98	99	100	100	0	0	0	1	1	1	0	3	2.1	NO
16	70	65	83	78	65	70	83	83	102	97	83	83	100	100	100	100	100	100	0	0	0	0	0	0	0	0	18	NO
17	80	63	106	10	103	112	95	79	136	136	127	130	100	100	100	100	100	100	0	0	0	1	0	1	0	2	22	NO
18	85	83	112	105	96	100	99	102	136	128	112	117	100	100	97	100	100	100	0	0	0	1	0	1	0	2	21.4	YES
19	69	68	90	65	77	69	81	79	117	83	89	81	100	100	98	99	100	100	0	0	0	0	0	0	0	0	18.1	NO
20	70	77	74	65	83	69	87	89	94	83	102	81	100	100	99	100	100	100	0	0	0	0	0	0	0	0	17	NO

INTUBATION PERFORMANCE IN AIRTRAQ LARYNGOSCOPE GROUP

S.No	Age Yrs	Sex	Wt. Kg	Ht. cm	BMI	ASA	MPC	TM Distance cm	PR						SYS. BP					
									Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min.	8th min.	10th min.	Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min.	8th min.	10th min.
21	40	F	68	164	25.3	2	2	> 6.5	72	82	104	98	90	70	140	132	140	133	131	129
22	32	M	73	170	25.3	1	1	> 6.5	78	70	98	87	80	81	122	127	145	131	120	128
23	65	M	60	169	21	2	1	> 6.5	84	86	108	97	91	87	141	149	156	151	141	137
24	62	F	43	150	19.1	2	1	> 6.5	86	90	112	90	94	82	98	87	101	99	113	91
25	18	F	42	154	17.7	1	1	> 6.5	80	87	100	9	81	74	120	113	131	118	120	116
26	48	F	80	160	31.2	2	2	< 6.5	82	77	114	112	99	90	128	118	143	134	134	137
27	29	M	78	172	26.4	1	2	> 6.5	76	75	90	72	74	76	120	129	141	125	129	129
28	25	M	80	173	26.7	1	2	> 6.5	74	70	88	84	86	76	101	98	120	131	122	123
29	43	F	60	165	22	1	1	> 6.5	82	84	100	92	88	80	135	136	154	147	142	136
30	64	F	45	160	17.6	2	2	> 6.5	88	90	98	90	92	92	143	137	156	150	143	135
31	19	M	73	169	25.6	1	1	> 6.5	98	80	88	83	80	70	113	118	129	120	128	118
32	41	M	80	172	27	2	2	> 6.5	98	92	106	110	104	98	133	135	149	141	137	133
33	32	M	81	170	28	1	3	> 6.5	9	95	110	98	97	88	131	120	135	137	125	128
34	23	F	43	162	16.4	1	1	> 6.5	86	80	98	100	90	82	127	125	149	140	136	135
35	25	F	49	163	18.4	1	1	> 6.5	72	72	90	92	88	78	126	127	164	143	149	131
36	60	M	52	168	18.4	2	2	> 6.5	108	80	120	104	102	92	113	122	131	133	116	120
37	18	F	35	154	14.8	1	1	> 6.5	96	82	96	88	82	76	110	118	125	128	118	91
38	32	M	74	173	24.7	1	1	> 6.5	70	84	98	90	88	85	131	125	145	128	129	135
39	50	F	74	160	28.9	2	2	> 6.5	68	70	116	104	97	91	140	139	156	141	135	136
40	48	M	85	165	31.2	2	1	< 6.5	65	74	104	102	88	80	149	132	149	145	131	132

INTUBATION PERFORMANCE IN AIRTRAQ LARYNGOSCOPE GROUP

Sl. No	DIA.BP						MAP						SPO2						IDS								Intubation Time sec.	Airway Trauma Yes/No
	Base Line 0 min.	Before Intubation 2nd min	After Intubation 4th min	6th min	8th min	10th min	Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min	8th min	10th min	Base Line 0 min.	Before Intubation 2nd min.	After Intubation 4th min.	6th min	8th min	10th min	N 1	N 2	N 3	N 4	N 5	N 6	N 7	Total		
21	89	84	88	78	80	85	10	103	105	97	100	99	100	100	100	100	100	100	0	0	0	0	0	0	0	0	17	NO
22	78	93	90	83	74	74	96	108	117	102	89	94	100	100	100	100	100	100	0	0	0	0	0	0	0	0	15.1	NO
23	96	99	112	97	96	85	112	122	136	115	112	104	100	100	99	100	100	100	0	0	0	0	0	0	0	0	14.3	NO
24	62	56	69	68	70	60	77	66	81	79	83	72	100	100	100	100	100	100	0	0	0	0	0	0	0	0	15.2	NO
25	76	70	80	65	76	77	92	83	100	84	92	89	100	100	100	100	100	100	0	0	0	0	0	0	0	0	14	NO
26	74	65	98	97	74	85	94	84	121	105	98	104	100	100	94	98	100	100	0	0	0	1	0	1	0	2	20	NO
27	74	85	96	112	77	85	89	99	95	99	87	99	100	100	100	100	100	100	0	0	0	0	0	0	0	0	16.2	NO
28	69	62	74	83	78	80	81	77	89	102	96	95	100	100	98	100	100	100	0	0	0	0	0	0	0	0	15.3	NO
29	58	58	94	94	90	58	102	184	128	112	101	84	100	100	100	100	100	100	0	0	0	0	0	0	0	0	14.3	NO
30	97	85	112	100	97	78	113	104	136	117	113	99	100	100	100	100	100	100	0	0	0	0	0	0	0	0	13.4	YES
31	70	65	85	76	77	65	83	84	99	92	95	84	100	100	100	100	100	100	0	0	0	0	0	0	0	0	15.2	NO
32	78	78	99	96	855	78	97	99	122	112	104	101	100	100	100	100	100	100	0	0	0	0	0	0	0	0	14.1	NO
33	80	76	78	85	77	74	100	92	99	104	95	94	100	100	95	99	100	100	0	0	0	1	1	1	0	3	22.1	YES
34	79	101	93	89	83	86	97	116	115	110	102	103	100	100	100	100	100	100	0	0	0	0	0	0	0	0	17.2	NO
35	80	80	103	98	93	83	101	97	127	121	115	102	100	100	100	100	100	100	0	0	0	0	0	0	0	0	13.9	NO
36	71	75	83	78	77	74	91	81	102	97	89	89	100	100	98	100	100	100	0	0	0	1	0	1	0	2	21.1	NO
37	76	65	77	74	65	60	92	83	95	94	84	72	100	100	100	100	100	100	0	0	0	0	0	0	0	0	14.1	NO
38	78	77	90	74	85	86	99	95	117	94	99	103	100	100	100	100	100	100	0	0	0	0	0	0	0	0	15.2	NO
39	88	89	112	96	58	58	105	108	136	112	102	84	100	100	100	100	100	100	0	0	0	0	0	0	0	0	17.6	NO
40	93	84	95	90	83	82	115	103	122	117	102	101	100	100	100	100	100	100	0	0	0	0	0	0	0	0	13.2	NO